



Options for Paying Military Physicians



A CBO STUDY

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE JUL 1990		2. REPORT TYPE		3. DATES COVERED 00-00-1990 to 00-00-1990	
4. TITLE AND SUBTITLE Options for Paying Military Physicians				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Congressional Budget Office,Ford House Office Building, 4th Floor ,Second and D Streets, SW ,Washington,DC,20515-6925				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 92	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

OPTIONS FOR PAYING MILITARY PHYSICIANS

**The Congress of the United States
Congressional Budget Office**

PREFACE

More than 13,000 physicians serve on active-duty in the medical corps of the Army, Navy, and Air Force. Although their first order of business is to be ready to care for casualties in a major war, they provide an essential health care benefit to the Department of Defense's large population of beneficiaries. Last year, to guard against any shortage of these professionals, the Congress authorized major increases in pay specifically for military physicians. This year, against a backdrop of uncertainty about the future size of the armed forces, the Congress will have to consider future changes in military medical pay. This study, prepared at the request of the Subcommittee on Military Personnel and Compensation of the House Committee on Armed Services, examines alternative plans for paying physicians and relates them to the number of physicians that may be needed. In keeping with the mandate of the Congressional Budget Office (CBO) to provide impartial analysis, the study makes no recommendations.

Joel Slackman of CBO's National Security Division wrote the study under the supervision of Robert F. Hale and Neil M. Singer. The author wishes to thank Kathy Langwell of CBO and Susan Hosek of the RAND Corporation for their comments and assistance. Grateful acknowledgement also goes to Dr. John Bircher and other members of the Office of the Assistant Secretary of Defense for Health Affairs for providing and helping to interpret a vast array of data. Responsibility for the final product, however, rests solely with CBO. Sherry Snyder edited the manuscript. Rhonda Wright prepared the study's early drafts, and Robert T. Whitney prepared the final draft for publication.

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Director

July 1990

CONTENTS

	SUMMARY	ix
I	INTRODUCTION AND BACKGROUND	1
	The Medical Special Pay System	2
	Recruiting Physicians	5
	Retaining Physicians	7
	Options for the Future	8
II	REQUIREMENTS FOR ACTIVE-DUTY PHYSICIANS	11
	Wartime Requirements	11
	Modifying Wartime Requirements to Meet Peacetime Needs	16
	Meeting the Needs of a Smaller Military	22
	Conclusion	29
III	ANALYSIS OF ALTERNATIVE PLANS FOR PAY	31
	Projecting Effects	31
	Options for a Larger Medical Corps	33
	Options for a Smaller Medical Corps	43
APPENDIXES		
A	Method for Analyzing the Effects of Pay	53
B	The Cost-Effectiveness of Military Physicians	67

TABLES

S-1.	Across-the-Board Military Pays for Active-Duty Physicians in 1990	x
S-2.	Targeted Military Pays for Active-Duty Physicians in 1990	xi
S-3.	Projected Steady-State Effects of Alternative Pay Plans	xii
1.	Military Pays of Active-Duty Physicians in 1988, 1989, 1990 and 1993	4
2.	Wartime Requirements for Active-Duty Physicians	13
3.	Budget Authorizations for Active-Duty Physicians	18
4.	Budget Authorizations Compared with Cost-Effective Additions for Active-Duty Physicians in 1990 Under Current Policy	20
5.	Requirements for Active-Duty Physicians for a Smaller Military Using Standards of Hospital Maintenance Organizations	26
6.	Percentage Distribution of Physicians by Specialty in Large Health Maintenance Organizations and in the Military Medical Corps	28
7.	Medical Special Pays of Typical Military Physicians in 1988 and Under Alternative Pay Options for Years Beyond 1990	34
8.	Projected Steady-State Effects of Continuing Current Pay Policy Compared with Budget- Authorized Standards	36

9.	Projected Steady-State Effects of Extending the Medical Officer Retention Bonus	40
10.	Projected Steady-State Effects of Paying a Flat Multiyear Bonus	42
11.	Projected Steady-State Effects of Current Policy and Multiyear Alternatives Compared with Requirements for a Smaller Military	44
12.	Projected Steady-State Effects of Freezing Pay for Five Years	47
13.	Projected Steady-State Effects of Holding Pay at Real 1990 Levels for Five Years and Reducing Accession of Volunteers by One-Third	48
A-1.	Estimated 1988 Retention Rates of Physicians at the End of Their Initial Obligation	54
A-2.	Retention Patterns of Surgeons and Orthopedic Surgeons on Duty in 1988, by Years of Active-Duty Service	57
A-3.	Explanatory Variables in the Logistic Regression Equations	60
A-4.	Maximum Likelihood Results for the Logistic Model	62
A-5.	Illustrative Example of the Shift Effect on Direct HPSP Surgeons	64
B-1.	Relationship Between Average Time Spent in Direct Patient Care by Primary Care Physicians and Their Perceived Access to Medical Specialists	70

B-2.	Actual and Desired Work Patterns of Physicians Who Are Assigned to Military Hospitals and Who See Patients	71
BOX		
1.	Determining Wartime Requirements	12

SUMMARY

In 1990, the Department of Defense (DoD) will spend around \$1 billion to pay the military's 13,000 active-duty physicians. Five types of compensation, referred to as the medical special pays, make up about \$370 million of that total. These special pays, which are the focus of this report, are variable special pay, additional special pay, board-certified pay, incentive special pay, and the medical officer retention bonus (MORB). Summary Tables 1 and 2 detail these pays.

For a physician who is a lieutenant colonel (with 12 years of military service), the sum total of these special pays can vary between \$29,000 and \$65,000. The range reflects differences in specialty (surgeons get paid more than primary care providers) and in willingness to stay on duty for two or more years (to receive a MORB, physicians must sign a multiyear contract). Starting next year, the authority to pay the MORB will end, and incentive special pay may increase to make up the difference.

The question for the future is whether this system of special pays will meet the Defense Department's need for physicians. Will enough physicians be willing to stay on active duty to take care of active-duty personnel, to be ready to take care of casualties in a major war, and to provide care in peacetime to about 7 million eligible beneficiaries who are not on active duty (dependents of active-duty personnel, retired military personnel and their dependents and survivors)? The answer depends in large part on assumptions about the future size of the military and the number of physicians required to attend it.

REQUIREMENTS UNDER CURRENT POLICY

Differing missions impose differing requirements on the services. To be ready for war, they need more surgeons and anesthesiologists. To provide care in peacetime, they need added specialists in primary care, particularly if those physicians can provide cost-effective care. When nonactive-duty beneficiaries cannot get care in military hospitals or

clinics, perhaps because of shortages of physicians, they may use the comparatively costly Civilian Health and Medical Program of the Uniformed Services (CHAMPUS). If the additional physicians increase the availability of medical services, and so cut down use of CHAMPUS, they are, in the Defense Department's view, cost-effective.

The services blend requirements for wartime and peacetime in so-called "budget authorizations," which show the number of physicians required in each medical specialty. Based on the 1988 budget authorizations for 1990, adjusted up to reflect cost-effective additions in various specialties, the services need roughly 10,540 active-duty physicians in the medical work force (plus another 300 or so physicians as administrators, and 3,500 physicians in graduate medical education). That amounts to about 1,370 physicians more than were on duty and not in training at the end of 1988.

SUMMARY TABLE 1. ACROSS-THE-BOARD MILITARY PAYS FOR ACTIVE-DUTY PHYSICIANS IN 1990 (In dollars)

Years of Military Service ^a	Available to All Military Officers (RMC) ^b	Available to All Physicians		
		VSP	ASP	BCP
1 but less than 2	32,873	1,200	c	c
2 but less than 6	37,066	5,000	c	c
6 but less than 8	44,109	12,000	15,000	2,500
8 but less than 10	45,566	11,500	15,000	2,500
10 but less than 12	48,037	11,000	15,000	3,500
12 but less than 14	53,511	10,000	15,000	4,000
14 but less than 18	58,290	9,000	15,000	5,000
18 but less than 22	69,416	8,000	15,000	6,000
Over 22	73,041	7,000	15,000	6,000

SOURCE: Congressional Budget Office.

NOTE: VSP = variable special pay; ASP = additional special pay; BCP = board-certified pay.

- a. Assumes that physician goes on active duty immediately after graduating from medical school and spends the first three to six years in graduate medical education.
- b. Regular military compensation is the sum of basic pay, basic allowance for quarters and subsistence, the variable housing allowance, and the estimated tax advantage from receiving those allowances. RMC shown here assumes that physician starts in pay grade O-3 (a captain in the Army), and advances to pay grade O-4 (major) in the sixth year of service, O-5 (lieutenant colonel) in the twelfth year, and O-6 (colonel) in the eighteenth year.
- c. Physicians in their initial residency training are not eligible.

Meeting Requirements by Continuing Current Policy

If the services continue current pay policy, they will be on the right track to having 10,540 active-duty physicians, but at a relatively high cost. Current policy is based on the 1990 defense authorization, which ends the multiyear MORB and allows the services to pay up to \$36,000 in incentive special pay by 1993, up \$20,000 from today's maximum. Presumably, all physicians would get at least \$8,000 in incentive special pay. (Periodic increases would be granted to maintain the real value of these pays.)

In the long run, continuing current policy should lead to having between 10,610 and 11,420 physicians on active duty. This projection is for a so-called "steady state," the time when the net effect of all projected gains and losses is one of no change. It assumes that 1,400 physicians a year enter the medical work force, and that the medical special pays are kept at their current levels in real terms. The range reflects alternative assumptions about the willingness of senior physicians to stay on active duty.

SUMMARY TABLE 2. TARGETED MILITARY PAYS FOR ACTIVE-DUTY PHYSICIANS IN 1990 (In dollars)

Years of Military Service ^a	<u>Incentive Special Pay^b</u>		<u>Medical Officer Retention Bonus^c</u>		
	Less than Six Years	More than Six Years	Two Years	Three Years	Four Years
Surgeon	10,000	16,000	10,000	15,000	20,000
Family Practitioner	0	0	1,500	3,000	8,000

SOURCE: Congressional Budget Office.

- a. These specialties represent the opposite ends of the earnings range for military as well as civilian physicians.
 - b. By years of experience as a fully trained physician.
 - c. By length of commitment; only physicians agreeing to stay on active duty for two or more years receive a MORB.
-

CBO's steady-state projection suggests that the services eventually will have enough physicians to meet at least 94 percent of each major specialty's requirements, with the exception of obstetrics/gynecology. Depending on the total number of added physicians, spending on medical special pays will rise to \$454 million or \$509 million (in 1990 dollars), roughly \$80 million to \$140 million a year higher than spending in 1990. (Summary Table 3 depicts these results, as well as those for other options.) Per added physician, these increases amount to average marginal costs of \$120,000 to \$150,000.

Meeting Requirements with a Multiyear Option

The relatively high cost of continuing current policy might argue in favor of basing some part of military medical pay on a multiyear com-

SUMMARY TABLE 3. PROJECTED STEADY-STATE EFFECTS OF ALTERNATIVE PAY PLANS

Plan	Medical Special Pays (Millions of 1990 dollars)	Number of Physicians ^a
Current (1990)	372 (Estimate)	9,200
Options to Meet Current Planning Requirements		
Continue Current Policy	454 to 509	10,610 to 11,420
Pay a Multiyear Bonus		
Extend the MORB	433 to 470	10,950 to 11,760
Pay a Flat Bonus	423 to 451	11,100 to 11,830
Options to Meet Reduced Force Requirements		
Freeze Pay	266 to 269	9,430 to 9,540
Hold Pay at Real 1990 Level	310 to 320	8,790 to 9,090 ^b

SOURCE: Congressional Budget Office.

NOTE: MORB = medical officer retention bonus.

- a. Excluding administrators and physicians in training as interns, residents, or fellows.
- b. Based on the entry of 1,225 physicians a year into the medical work force--175 fewer than under the other options.

mitment. One option is to extend the medical officer retention bonus, which is due to end this year. The MORB pays the various specialties widely differing amounts. An alternative approach would pay a flat multiyear bonus to all physicians regardless of specialty, up to \$8,000 a year for a commitment to stay for four years.

Multiyear options carry some risk of appealing only to physicians who would have stayed for several more years regardless of the bonus. But if they encourage longer stays or if they encourage increased retention--which evidence from the 1989 MORB suggests as possibilities--the multiyear options may perform about as well as continuing current policy, and at lower cost.

In the long run, extending the MORB would lead to a medical corps with 10,950 to 11,760 active-duty physicians. The range reflects differing assumptions about the effectiveness of multiyear bonuses and the willingness of senior physicians to stay in service. All specialties would be filled to 90 percent or more of requirements. Spending on medical special pays would rise above current levels, but it would be lower (up to \$60 million a year lower) than if current policy continued. Paying a flat multiyear bonus would differ in effect primarily by producing fewer surgeons, perhaps too few to meet the budget authorizations. Still, it would eventually add more than 1,900 physicians to the active-duty force, compared with 1988 end strengths.

LOWERED REQUIREMENTS

Changing conditions, however, may sweep away the requirement for 10,540 physicians. Reductions in the size of the armed forces, coupled with a greater focus on satisfying medical needs in peacetime, could decrease the military's need for physicians. For the sake of illustration, one might consider the implications of a one-third reduction in the military, to 1.4 million active-duty personnel. Such a decline would reduce by one-fifth, to 6.6 million, the total population that is served by military physicians.

Based on staffing patterns in large, civilian health maintenance organizations--a form of prepaid group practice that delivers health care at relatively low cost--the military would need about 8,320 active-duty physicians to serve the health care needs of 6.6 million people. Not only would the medical corps have to contract, but its mix of specialties would have to shift--away from surgery, in particular, to internal medicine and obstetrics/gynecology. Relative to this illustrative standard, all of the options (continuing current policy, extending the MORB, or paying flat multiyear bonuses) would result in far too many physicians.

Options for Meeting Lower Requirements

If fewer physicians are needed, then the Congress may wish to consider a nominal freeze or a real freeze on physicians' special pay.

Nominal Freeze. The option of a nominal freeze would end the MORB and hold the remaining medical special pays at their current dollar levels for five years. This would return medical special pays to just below their real levels of 1988. Such an approach would parallel past actions by the Congress.

CBO's steady-state projections show that a nominal freeze would lead to 9,430 to 9,540 active-duty physicians, more than enough to meet the overall requirement. All major specialties, except for some medical subspecialties and obstetrics/gynecology, would be filled to more than 98 percent of need. Finally, long-run annual costs would amount to about \$270 million a year, at least \$180 million less than if current policy continued.

Real Freeze. A long-lasting nominal freeze may do serious damage to physicians' morale, as well as cause serious imbalances among the specialties. The alternative option would freeze medical special pays (excluding the MORB) at today's levels; starting in 1991, incentive special pay would increase just enough to keep the sum total of all medical special pays from declining in real terms. To keep the medical corps from becoming too large and exceeding the lower requirements, the services would also need to recruit fewer physicians; rather than

cut back the number of awards from the Health Professionals Scholarship Program (which pay for medical school in return for an active-duty obligation), the services would presumably take in fewer fully trained, volunteer physicians. Frozen pay and tightened recruiting together would produce an active-duty work force of 8,790 to 9,090 physicians, at a cost in special pay of \$310 million to \$320 million a year--more than a nominal freeze but still less than under current policy.

CHAPTER I

INTRODUCTION AND BACKGROUND

More than 13,000 physicians serve on active duty in the armed forces medical corps. They care for the 2.1 million men and women on active duty and are ready to take care of casualties in a major war. Military physicians also provide peacetime medical services to dependents of active-duty personnel and retired military personnel and their dependents. If they did not, these beneficiaries would have to get their care through the military's relatively costly health insurance plan, the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS).

To compensate for the lucrative civilian opportunities they forgo, military physicians receive a distinctive combination of special pays. There has been much concern about the adequacy of these pays in recent years, in part because of a decline in the willingness of physicians to stay in the military when their obligations end. In response, the Congress has considered a variety of proposals to improve military medical pay. Some proposals have been enacted; others are likely to be debated over the next few years. This study looks at possible changes in the pay of military physicians and relates these changes to the number of physicians that may be needed.

Requirements for physicians are critical to any assessment of pay. Are 13,000 active-duty physicians enough? Under today's assumptions about force planning, probably not. The Department of Defense needs more general surgeons, orthopedic surgeons, and anesthesiologists to be ready for war; it needs more pediatricians, internists, family practitioners, and obstetricians and gynecologists to satisfy the ever-growing demand by nonactive-duty beneficiaries for medical care and to reduce beneficiaries' use of CHAMPUS. But recent political events, coupled with arms limitation treaties now under negotiation, raise the prospect of substantial reductions in the active-duty forces. If this happens,

and wartime considerations diminish in importance, 13,000 active-duty physicians may prove to be too many.

This report discusses the issue of requirements for the size and composition of the military medical corps and analyzes alternative pay plans for physicians in light of those requirements. It considers not only the level of pay but also its form, focusing on the desirability of demanding that physicians commit themselves to remaining in the military for two or more additional years to qualify for larger pay hikes.

THE MEDICAL SPECIAL PAY SYSTEM

Like other military officers, active-duty physicians receive regular military compensation, or RMC. RMC essentially is the sum of basic pay and the basic allowances for food and housing; it therefore varies by rank and years of service. Military physicians also receive medical special pay. The present system for special pay dates to 1980, when the Congress passed the Uniformed Services Health Professionals Special Pay Act. The act created four types of pay: variable special pay (VSP), additional special pay (ASP), board-certified pay (BCP), and incentive special pay (ISP). The first three are "across-the-board" pays because all physicians receive them regardless of specialty. Incentive special pay, in contrast, is a targeted pay, which the services direct to medical specialties in which they have shortages.

Between 1980 and 1988, these pays lost about one-third of their value to inflation. In 1989 and 1990, they regained lost ground when the Congress increased the across-the-board pays an average of \$8,000 and raised the statutory ceiling on ISP from \$8,000 to \$16,000. The ceiling on ISP will rise to \$22,000 in 1991, \$29,000 in 1992, and \$36,000 in 1993.

In 1989, the Congress thickened the alphabet soup of VSP, ASP, BCP, and ISP with a new type of targeted pay called the MORB, a medical officer retention bonus. Passed as a one-year measure, it was extended into 1990, after which it is due to end.¹ The MORB goes to

1. The 1990 defense authorization, which extended the MORB for one year, actually widened eligibility. In 1989, eligibility for the MORB was limited to physicians who had more than eight years of creditable service (counted as time on active duty plus any time served in a civilian residency program) and less than two years left of obligated service. In 1990, eligibility includes virtually all physicians who have finished their initial residency training.

physicians who agree to stay in the military for two, three, or four years--the longer they agree to stay, the greater the bonus. Like incentive special pay, the bonus varies by specialty, apparently to reflect the differences in compensation available to civilian counterparts. Surgeons have the highest potential civilian earnings and so receive the highest maximum bonus of \$20,000 a year; family practitioners have among the lowest potential civilian earnings and get the lowest maximum bonus of \$8,000 a year.

Regular military compensation makes up the largest part of any physician's pay. Its share, however, has declined since 1988 as a result of Congressional actions that raised the special pays. Table 1 shows the RMC and special pays for typical family practitioners and surgeons--two specialties representing opposite ends of the earnings range for civilian physicians--who are lieutenant colonels with 12 years of military service (including time as residents while on active duty). To highlight the effects of recent changes, the table includes pay for 1988, 1989, 1990, and 1993.

The across-the-board pays make up the next major chunk of income. Beginning in 1990, additional special pay of \$15,000 goes to all physicians who are past their initial residency. Variable special pay (VSP) is linked to years of service, starting at \$1,200 a year for interns, peaking at \$12,000 for physicians with six to eight years of service, then gradually declining to \$7,000 for physicians with 22 or more years' service. Finally, board-certified pay increases steadily with years of service, up to \$6,000 for physicians with 18 or more years of service. At 12 years of service, these pays total \$29,000 a year. The idiosyncratic design of the across-the-board pays offers physicians a modest incentive to become board certified. From the time they have seven years of service to the time they have 23 years, physicians who are not board certified will receive \$5,000 less in across-the-board pay; if board certified, they will lose only \$1,500.

Incentive special pay varies by specialty and years of experience. It was originally intended as an additional incentive for physicians in specialties in critical supply. Before 1988, each service set ISP in its own way, subject to an \$8,000 ceiling on payments. Furthermore, the total amount payable as incentive special pay to all military medical

officers was not allowed to exceed 6 percent of the total amount of the across-the-board pays. Surgeons tended to get the most, and specialists in primary care received no ISP. In 1989, after the Congress removed the \$8,000 ceiling for physicians whose skills would be in critically short supply in wartime, the Defense Department directed that selected specialists receive \$16,000 if they had more than six years' experience, and \$10,000 if they had less. The services were permitted to dis-

TABLE 1. MILITARY PAYS OF ACTIVE-DUTY PHYSICIANS
IN 1988, 1989, 1990, AND 1993 (In thousands of dollars)

		Across-the-Board Pays				Targeted Pays			Total Pay	
	RMC	VSP	ASP	BCP	ISP	MORB ^a			Mini- mum	Maxi- mum
						Two	Three	Four		
Rates in 1988										
Family Practitioner Surgeon	49.3	8.0	10.0	3.0	0	0	0	0	70.3	70.3
	49.3	8.0	10.0	3.0	8.0	0	0	0	78.3	78.3
Rates in 1989										
Family Practitioner Surgeon	51.7	8.0	10.0	3.0	0	1.5	3.0	8.0	72.7	80.7
	51.7	8.0	10.0	3.0	16.0	10.0	15.0	20.0	88.7	108.7
Rates in 1990										
Family Practitioner Surgeon	53.6	10.0	15.0	4.0	0	1.5	3.0	8.0	82.6	90.6
	53.6	10.0	15.0	4.0	16.0	10.0	15.0	20.0	98.6	118.6
Rates in 1993										
Family Practitioner Surgeon	60.2 ^b	10.0	15.0	4.0	8.0 ^c	0	0	0	97.2	97.2
	60.2 ^b	10.0	15.0	4.0	36.0 ^c	0	0	0	125.2	125.2

SOURCE: Congressional Budget Office.

NOTES: Assumes a board-certified physician in pay grade 0-5 (for example, a lieutenant colonel in the Army) who trained as a resident while on active duty and has 12 years of creditable service.

RMC = regular military compensation; VSP = variable special pay; ASP = additional special pay; BCP = board-certified pay; ISP = incentive special pay; MORB = medical officer retention bonus.

- Medical officer retention bonus, by years of commitment.
- Estimated assuming that regular military compensation increases at same rate as basic pay.
- Assumes that by 1993 ISP will rise to an amount equal to the sum of ISP and the maximum MORB in 1990.

tribute any remaining funds to physicians in other specialties, up to the \$8,000 ceiling; they continued to assign no funds to specialists in primary care. The 1990 authorization lifted the ceiling to \$16,000 for all physicians, but it effectively held ISP payments to their 1989 levels. Thus, surgeons now get ISP of \$16,000 a year, and family practitioners still get nothing.

That situation may change, however. Family practitioners currently can get a retention bonus of up to \$8,000 a year for a four-year stay. This amount may determine the amount of ISP to be paid in 1993. Under the terms of the 1990 defense authorization, which ends the MORB, the Defense Department is supposed to increase incentive special pay to counteract the loss of the maximum MORB. Thus, family practitioners will presumably be eligible for \$8,000 in incentive special pay in 1993. Surgeons will get the maximum of \$36,000, because they will get a \$20,000 retention bonus on top of \$16,000 in ISP.

Put together, regular military compensation and the medical special pays now give a moderately experienced military surgeon between \$99,000 and \$119,000 a year, and a family practitioner \$83,000 to \$91,000. The range reflects the acceptance or rejection of a MORB. Although generous by military standards, these amounts are lower, sometimes considerably so, than what physicians could make in private practice. American Medical Association (AMA) data suggest that the typical family practitioner with five to nine years of experience earns more than \$90,000 a year (after professional expenses but before taxes); the typical surgeon earns more than \$200,000.

RECRUITING PHYSICIANS

Despite the divergence between military and civilian earnings, the military services are able to recruit at least 1,400 physicians for active-duty service each year. The reason is that the vast majority (70 percent in 1988) enter the military through the Armed Forces Health Professionals Scholarship Program (HPSP), which was authorized in the early 1970s to pay for medical school tuition and expenses in exchange for an obligation to serve. About 60 percent of HPSP participants come on active duty right out of medical school (direct HPSP)

and receive their graduate medical education in a military training program. The others defer their active-duty service--subject to the approval of their branch of service--to receive residency training in civilian institutions (deferred HPSP), then come on active duty as fully trained specialists.

Volunteers make up the next major category of recruited physicians (about 20 percent in 1988). They are fully qualified physicians who leave civilian practices to join the military, many hoping to get advanced training. The remaining recruits come from the Uniformed Services University of the Health Sciences, the Reserve Officer Training Corps, and the service academies.

The HPSP has strong appeal because it greatly eases the cost of a medical education, thus raising its "rate of return." If medical education is viewed as an investment, the rate of return reflects the comparison between the costs of a medical education and the expected higher incomes physicians earn compared with other college graduates.² The HPSP lowers a prospective physician's training costs; it covers medical school tuition and fees, which average \$16,000 a year in private institutions, and provides a stipend for living expenses of about \$700 a month. Moreover, direct HPSP participants benefit from receiving their graduate medical education (GME) in the military, because as officers they earn more than they would as residents in a civilian hospital. One implication of a rate-of-return analysis is that HPSP scholarships leading to military GME should be more popular than scholarships that lead to civilian training. Differences among the services appear to bear this out.

HPSP scholarships have had a noticeable effect on recruiting success. Throughout the 1980s, even as inflation eroded the value of the medical special pays, the ratio of HPSP applicants to awards stayed better than 2 to 1 in the Air Force (which has the highest percentage of deferred physicians in its scholarship program), and generally better than 3 to 1 in the Army and Navy. For comparison, applications to

2. More precisely, the internal rate of return is that discount rate which, when applied to the future earnings stream, will make its present value equal to the cost of entry into that profession. Various studies have placed the rate of return to physicians since 1970 in the neighborhood of 15 percent to 20 percent. See Paul Feldstein, *Health Care Economics* (New York: John Wiley and Sons, 1988).

medical schools have declined substantially over the past decade; for every acceptance, medical schools attracted about 2 applicants in 1980, only 1.6 applicants in 1988. The steady ratio of applicants to awards suggests that the HPSP's rate of return, and hence the military's ability to attract recruits, will not suffer if the value of medical special pay drops from today's relatively high levels. Nor will increases in pay do more than gild the lily.

RETAINING PHYSICIANS

While the military has done well at recruiting physicians through the scholarship program, the willingness of physicians to stay past their initial period of obligation has been on the decline. Between 1982 and 1985, the retention rate among physicians at the end of their first obligation averaged about 53 percent. Rates of retention dropped to 47 percent in 1986, 39 percent in 1987, and 37 percent in 1988. Declines extended across all services and most medical specialties. Once physicians elected to stay, however, they tended to continue serving at steady rates. Rates of retention after the initial obligation dropped only slightly, from 88 percent in 1982 to 85 percent in 1988.

Initial retention has declined largely because of the changing mix between physicians who entered the military as volunteers and those who entered through the scholarship program. Although the HPSP began in the early 1970s, it took several years before HPSP graduates made up a sizable proportion of physicians making their first reenlistment decision, because of the time in medical school (four years), in graduate medical education (two to six years), and in the initial period of obligated service (three to four years). Although favorable for recruiting, the HPSP is likely to attract a disproportionate share of people who plan on leaving early, and so carries a price in the form of reduced retention. Whereas 54 percent of volunteers stayed past their initial obligation in 1988, only 36 percent of direct HPSP participants and 22 percent of deferred participants stayed. Differing rates of return may be the reason. Prospective candidates for an HPSP scholarship face a higher rate of return if they plan on leaving the military as soon as possible--when their initial obligation ends, usually after a period of three to four years--than if they plan on making the military

a career. The margin in favor of leaving is even greater if prospective candidates expect to defer active-duty service to train as relatively low-paid civilian residents.

In 1982, more than one-half the physicians making their first decision to stay or leave the service were volunteers, and only one-third were HPSP graduates. By 1988, volunteers made up only one-fifth of physicians making their first stay-or-leave decision; HPSP graduates made up three-quarters. Had the mix of volunteer and HPSP physicians been the same in 1988 as in 1982, the overall rate of initial retention would have been 47 percent, 10 percentage points above the actual rate. The changing mix of volunteers and HPSP graduates therefore accounted for about one-half the decline in initial retention between 1982 and 1988.

Another major reason for the decline in initial retention is the previously mentioned erosion in military earnings. A statistical analysis of the relationship between pay and retention found that a 10 percent decrease in the relative value of military pay would generally lead to a 6 percent decrease in the rate of retention. (The analysis measured pay by the ratio of military earnings to net civilian income, varied by medical specialty and years of experience; see Appendix A for details.) Counting all the parts of military pay--basic pays and allowances as well as medical special pays--military pay for physicians at the end of their first obligation fell by an average of about 16 percent between 1982 and 1988, compared with average net civilian incomes. Thus, erosion of physicians' pay was responsible for about one-third of the overall decline in initial retention since 1982.

OPTIONS FOR THE FUTURE

The present system of recruiting and paying physicians has served the military fairly well over the past decade. Despite several years of declining retention, about 740 more physicians served on active duty in the medical work force in 1988 than in 1982, an increase of about 9 percent. Reflecting satisfaction with the present system's basic structure, the Congress has, over the last two years, sought to improve the size and experience of the medical corps by approving incremental changes that are nonetheless significant--more money for the across-

the-board pays, higher incentive special pay, and a new multiyear bonus that supplements, rather than supersedes, the older pays.

This report follows the lead of the Congress in assuming no fundamental changes in recruiting and paying physicians, and does not consider the possible advantages of departing from the present system. For instance, the success of the Health Professionals Scholarship Program suggests at least one alternative course: increasing the length of the active-duty service obligation. Longer obligations would lessen the appeal of the HPSP program, but its rate of return--already quite favorable, as evidenced by the high ratio of applicants to awards--might still remain impressive enough to attract an adequate supply of applicants. The military could therefore get added years of service from each scholarship student without disrupting recruiting. Other measures that have little to do with pay--for instance, improved working conditions and enhanced ancillary support--might greatly improve the retention of more senior physicians. (Pay stands out, however, because it is the device most easily controlled by the Congress, as well as most directly linked to the retention of physicians.)

Nor does this report examine how future changes in the civilian sector could spur farther-reaching changes in military medical pay. For example, a dramatic increase in the supply of physicians--projected by the AMA to rise 13 percent over the next decade--may increase competition for new opportunities to practice and thus improve the military's relative attractiveness. At the same time, both the private sector and federal government will probably intensify efforts to contain costs--for instance, physicians can expect more outside review of their clinical decisions and added pressure to discount their fees and join preferred provider organizations. These changes will affect the way that physicians practice medicine and might therefore enhance the appeal of practicing in the military. (That said, pressure to contain costs will undoubtedly bring about parallel changes in the practice of military medicine.) Finally, the Medicare program is about to start a radically different payment system for physicians that will reduce payments to surgeons while increasing them for primary care practitioners. If this change narrows differences in income between surgical and primary care specialists, the military might have to consider similar changes to its pay structure.

CHAPTER II

REQUIREMENTS FOR ACTIVE-DUTY

PHYSICIANS

How many active-duty physicians does the military need? Under current Department of Defense (DoD) policy, the primary criterion determining the size and composition of the active-duty medical corps is medical readiness for war. Readiness dictates that the military have a permanent medical cadre in peacetime--especially surgeons and anesthesiologists--to treat casualties in the early stages of a major war, before the reserves or draftees are mobilized. As a criterion of lower priority, the services may add physicians--primarily internists, family practitioners, pediatricians, and obstetricians--to the active-duty force if it is the most cost-effective means of meeting DoD's peacetime health care objectives.

Today's requirements, however, may not be consistent with tomorrow's needs. The easing of military tensions overseas, combined with increasing budgetary concerns at home, seems likely to bring about substantial reductions in the active-duty forces. If the reserves assume a larger role in maintaining medical readiness for war, the military services will probably need fewer physicians, not more.

WARTIME REQUIREMENTS

Medical requirements for war stem from the Secretary of Defense's annual guidance, which outlines the conflict to be fought. Using a standardized computer simulation model and various service-specific rules, medical planners in the Offices of the Surgeons General estimate the overall need for physicians (see Box 1). Following the Secretary's guidance, they assign to the active component only those personnel required for wartime before the reserves will become available.

The most recently available requirements for war are based on defense guidance from fiscal year 1987. (The Defense Department has

BOX 1
DETERMINING WARTIME REQUIREMENTS

In a large-scale war, physicians would serve in three basic settings: hospitals outside the continental United States (CONUS), nonhospital units, and hospitals and clinics in CONUS. The requirement for hospital-based physicians in the theater of operations comes from a computer model known as the MPM (Medical Planning Module, a subsystem of the Joint Operations Planning System). Each service estimates the number of combatants likely to need hospital care for battlefield wounds, non-battle-related injuries, or disease. Based on that work load, the MPM calculates the number of physicians required at the peak of battle (30 days after war begins). It breaks this number down into five categories: anesthesiologists, orthopedic surgeons, general surgeons, other surgeons, and other physicians. The services then decide how to divide these numbers between the active-duty and reserve components. They also decide--each in its own way--how many physicians will serve outside hospitals, in such places as aid stations, ships, and aeromedical evacuation units, as well as in CONUS. Army planners, for example, carry out a "Total Army Analysis" that builds the medical force structure based on a ratio of medical units to combat units. The Navy follows the "existence rule," which states that for a given combat unit to exist in a combat theater, supporting units that are part of that combat unit must also exist there. This rule leads to a constant requirement for physicians--one that is relatively independent of casualties.

not since adopted an official set of wartime requirements because of inconsistencies that were discovered in the various service-specific rules.) The requirements call for a total of 31,496 physicians--18,100 in the reserve forces and 13,396 on active duty. Although several years out of date, these requirements illustrate the challenge of preparing the medical corps for war.

Shortages

In 1988, the active-duty medical corps met 92 percent of the 1987 requirement. Table 2 compares the active-duty wartime requirement with the number of physicians actually on active duty in 1988--about 10,000 active-duty physicians past their initial residency training (including 500 medical fellows in advanced training) and about 2,400

active-duty physicians who are in graduate medical education programs, training for a specialty. The severest shortages existed among surgeons, orthopedic surgeons, and anesthesiologists: the services needed 3,174 active-duty physicians trained in these specialties, but had only 1,690. Shortages were also severe among other surgical specialists, including otolaryngologists, ophthalmologists, and urologists.

TABLE 2. WARTIME REQUIREMENTS FOR ACTIVE-DUTY PHYSICIANS

Specialty	1987 Requirements				On Active Duty in 1988			Total as Percentage of Active Requirement
	Reserve	Active	Total	Active as Percentage of Total	Nonresidents ^a	Residents ^b	Total	
Surgical								
General and specialized surgery ^c	2,569	1,735	4,304	40	713	124	837	48
Orthopedic surgery	2,223	825	3,048	27	352	106	458	56
Anesthesiology	1,426	614	2,040	30	310	85	395	64
Obstetrics/gynecology	404	268	672	40	476	102	578	216
Other ^d	875	657	1,532	43	462	110	572	87
Subtotal	7,497	4,099	11,596	35	2,313	527	2,840	69
Medical								
General and family practice	3,509	3,390	6,899	49	2,189	1,311	3,500	103
Other ^e	7,094	5,907	13,001	45	5,473	536	6,009	102
Subtotal	10,603	9,297	19,900	47	7,662	1,847	9,509	102
Total	18,100	13,396	31,496	43	9,975	2,374	12,349	92

SOURCE: Congressional Budget Office based on data from Department of Defense, *Health Manpower Statistics*, Fiscal Years 1987 and 1988.

- Includes physicians not in training as well as medical fellows (physicians in advanced training who are counted toward meeting their specialty's wartime requirements).
- Half the residents in each specialty are counted toward satisfying that specialty's requirements; the other half (those who have completed less than half their training) are counted toward the requirement for general medicine. Interns are not counted toward meeting wartime requirements. Also not counted are about 1,300 physicians who received health professions scholarships, but whose service obligations have been deferred until they complete their graduate medical education in the civilian sector; they would count toward meeting wartime requirements for reserve personnel.
- Includes vascular, plastic, neurological, and thoracic surgery.
- Ophthalmology, otolaryngology, and urology.
- Aviation, dermatology, executive medicine, emergency medicine, neurology, pediatrics, pathology, physical medicine, internal medicine, preventive medicine, psychiatry, radiology and nuclear medicine, and undersea medicine.

Taken as a whole, the various surgical specialties met only 69 percent of their wartime requirement. In contrast, shortages were nonexistent among medical specialists--physicians who ply their skills outside the operating room. (General and family practitioners make up about 36 percent of the physicians needed in this category, the rest being specialists in a range of fields such as internal medicine, radiology, and psychiatry.) The medical corps met 102 percent of the overall requirement for such physicians.

Limitations of the Wartime Requirements

Although the military appears to need many more surgeons and anesthesiologists on active duty, the services could not fully employ the required number of added general and orthopedic surgeons in peacetime. Nor do the wartime requirements fully exploit the potential contribution of nonsurgeons toward meeting surgical needs.

Constraints on Use of Surgeons in Peacetime. Unless its patient base grows in some unexpected way, the military will find it challenging to employ in peacetime the additional 1,265 or so general and orthopedic surgeons needed for war because the patient base simply would produce too few cases to keep surgeons technically proficient. According to data reported by military hospitals to the American Hospital Association's annual survey, military physicians in surgical specialties perform an average of seven to ten surgical procedures a week, half of them on outpatients.¹ If they were to perform just two or three major operations a week--which might happen if the number of active-duty surgeons nearly doubled to meet the 1987 wartime requirements--technical skills would become suspect, insofar as acquiring and maintaining technical competence requires repetitive, hands-on performance.²

1. Of the 126 military hospitals responding to the survey, 80 gave complete information on the number of physicians on the hospital's medical staff and on the number of surgical procedures. The range of seven to ten reflects uncertainty about the role of surgical residents and of gynecologists in performing operations. Civilian surgeons, on average, perform seven operations per week, suggesting that military physicians in the surgical specialties are now about as busy as their civilian peers. However, not too much should be made of this comparison because such unweighted counts of the number of surgeries fails to account for the complexity of the tasks involved. See Jerry Cromwell and Margo Rosenbach, "The Impact of Nurse Anesthetists on Anesthesiologist Productivity," *Medical Care*, vol. 28, no. 2 (February 1990).
2. Book review of *Socioeconomics of Surgery*, in *The New England Journal of Medicine*, vol. 321, no. 12 (September 21, 1989).

Nor is there much potential for accommodating additional surgeons through increases in the number of nonactive-duty patients. In 1987, for example, about 31,000 nonactive-duty beneficiaries who lived within 40 miles of a military hospital (inside so-called catchment areas) received inpatient surgical care in civilian hospitals under the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS). If 50 percent of these beneficiaries had instead been treated in military hospitals ("regained" by the military), the military would have needed no more than an additional 229 general, specialized, and orthopedic surgeons to handle the increased work load.³

Potential Contributions of Nonsurgeons. To a great extent, physicians who are not surgeons could ease the apparent wartime shortage of surgeons. In wartime, many physicians would cross over from their peacetime specialties to help general surgeons care for those wounded in action. Gynecologists and urologists in particular would be able to perform a very substantial part of the general surgeon's work load. A study by the Defense Department found that these specialists, when properly deployed in general surgical teams, would reduce the active-duty shortage of general surgical manpower from several hundred to less than 100.⁴ The shortage might shrink further if medical specialists, such as internists and pediatricians, were to "extend" surgeons by carrying out preoperative and postoperative patient management.⁵

A further way to meet wartime needs is to cross-train physicians whose peacetime specialties would not be as critical in wartime. Consider the case of orthopedic surgery, a wartime skill in short supply. Under present levels of training, family practice and emergency medicine physicians would be able to perform fewer than one-fifth of the anticipated wartime tasks of an orthopedic surgeon. A proposed

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3. Office of the Assistant Secretary of Defense for Program Analysis and Evaluation, *Peacetime Requirements for Physicians and Nurses in the DoD Direct Care System* (February 1989).
 4. Office of the Army Surgeon General, *Tri-Service Physician Wartime Cross-Utilization and Skill Enhancement* (March 1988). Specifically, gynecologists and urologists are able to carry out about 70 percent of the general surgical tasks that would be performed in war. Thus, they would contribute at least as much to accomplishing the surgical mission as would a general surgical resident who had completed 50 percent of the requisite training.
 5. Susan Hosek and others, *Reconciling Air Force Physicians' Peacetime and Wartime Capabilities* (Santa Monica: RAND Corporation, August 1985).

seven-day training course would give these specialists the basic competence to perform roughly 60 percent of the tasks frequently carried out by orthopedic surgeons in the theater of operations. Indeed, DoD's Advisory Committee on Graduate Medical Education has urged that all active-duty physicians lacking wartime skills receive training to ensure a more effective transfer to wartime. For example, family practitioners in the Air Force might receive training in flight medicine and thus help fill an understaffed wartime specialty.

Cross-training carries a price. It demands considerable investments for travel, supplies, and laboratory animals. More important, it would divert students and faculty from providing peacetime care, thus lowering productivity and possibly forcing patients to use relatively more expensive civilian facilities under CHAMPUS.

MODIFYING WARTIME REQUIREMENTS TO MEET PEACETIME NEEDS

Wartime considerations alone may be too narrow a basis for deciding the military's need for physicians. To function in peacetime, the military health care system needs physicians in a wide range of specialties to take care of active-duty and nonactive-duty patients, as well as physicians to run the military's graduate medical education programs and to administer policy. Under current DoD policy, the services may depart from their pure wartime requirements in the interest of cost-effectiveness; that is, they may expand the number of full-time physicians assigned to the active-duty forces if that is the most cost-effective way of providing health care benefits. Peacetime constraints on the use of surgeons, and the potential for "cross-using" nonsurgeons, give the services added reasons to modify their wartime requirements.

Each service has requirements that, if not based on cost-effectiveness, are consonant with that criterion. Known as budget authorizations, they are essentially wartime requirements that have been adjusted--down, in most cases--to reflect peacetime constraints on funds and work loads. (Formally, budget authorizations are spaces in the programmed manpower structure that the services are officially authorized to fill.) They reflect not only the services' interest in having

more surgeons, but also an interest in having more specialists whose skills are highly demanded in peacetime. However, one cannot tell which part of the budget authorization meets the needs of wartime and which part supports the peacetime mission of providing a cost-effective medical benefit.

Budget Authorizations

The budget authorization in 1988 planned for about 10,600 active-duty physicians in 1990--excluding residents, fellows, and interns. That figure is 12 percent above the number of physicians on active duty at the end of 1988 (at the time of this analysis, the most recent year for which validated statistics were available). Thus, by the budget-authorized standard, the medical corps needs an additional 1,123 physicians (see Table 3).

The budget authorizations differ from the wartime requirements in their emphasis on nonsurgical specialties. While both call for large percentage increases in the number of active-duty surgeons, the authorizations favor disproportionately large increases for such nonsurgical specialists as family practitioners. Moreover, several specialties have budget authorizations that exceed their 1987 wartime requirements, including obstetrics/gynecology.

In all but a few medical fields, most notably general medicine, the 1990 budget authorizations call for large increases over 1988 end strengths. Most specialties meet less than 90 percent of authorized requirements. Several meet less than 80 percent of requirements, including each of the surgical specialties and family practice.

The differences between the services' authorizations for 1990 and 1988 suggest a distinct preference for adding both surgeons and family practitioners. When the services put together their budget authorizations in 1988, they allowed for only about 3 percent growth between 1988 and 1990 (from 10,263 to 10,618 full-time physicians). But, reflecting the importance of wartime considerations, the services planned to increase authorized requirements for surgeons and anesthesiologists by 248 (16 percent). The only other specialty to gain

substantially between 1988 and 1990 (by 168, or 15 percent) was family practice. The Army has a program to assign each active-duty family a family practice physician, hence its decision to require more such specialists.

The big loser was the category of general medicine, whose budget authorization shrank by 126 between 1988 and 1990. Evidently, the services hope to shift an increasing number of patients to the care of

TABLE 3. BUDGET AUTHORIZATIONS FOR ACTIVE-DUTY PHYSICIANS

Specialty	End Strength in 1988 ^a	1988 Authori- zation	Number	1990 Authorization			Change from 1988 Authori- zation
				Per- centage Met in 1988	Required Addition		
					Number	Per- centage	
Surgical-Related							
General and special- ized surgery ^b	664	760	888	75	224	34	128
Orthopedic surgery	342	402	466	73	124	36	64
Ophthalmology	164	195	195	84	31	19	0
Otolaryngology	142	169	165	86	23	16	-4
Urology	132	157	159	83	27	20	2
Obstetrics/gynecology	450	558	567	79	117	26	9
Anesthesiology	310	346	402	77	92	30	56
Subtotal	2,204	2,587	2,842	78	638	29	255
Medical							
Family practice	950	1,122	1,290	74	340	36	168
General medicine	1,239	1,131	1,005	123	-234	-19	-126
Other ^c	4,776	5,105	5,163	93	387	8	58
Subtotal	6,965	7,358	7,458	93	493	7	100
Administration	326	318	318	103	-8	-2	0
Total	9,495	10,263	10,618	89	1,123	12	355

SOURCE: Congressional Budget Office based on data from Department of Defense, *Health Manpower Statistics*, Fiscal Year 1988.

NOTE: These data do not reflect any of the reductions in military manpower now being considered.

a. Includes only physicians not in training.

b. Includes vascular, plastic, neurological, and thoracic surgery.

c. Aviation, dermatology, emergency medicine, neurology, pediatrics, pathology, physical medicine, internal medicine, preventive medicine, psychiatry, radiology and nuclear medicine, and undersea medicine.

specialists, a trend that will raise costs. Unlike general medical officers, specialists can receive incentive special pay and medical officer retention bonuses. Higher costs surely would be acceptable if the only alternative to a specialist is an untutored generalist. If that is not the only alternative--a distinct possibility--then the services may want to reconsider the balance between medical specialists and generalists.

Cost-Effectiveness

Are the increases contained in the budget authorizations cost-effective? A recent DoD study offers some preliminary answers. The study, which is discussed in Appendix B, bases its judgment of cost-effectiveness on the amount of health care that would be economical for military hospitals and clinics to regain from the military's civilian insurance program, CHAMPUS. The study looked at two cases: a low case that assumed that every decrease in the CHAMPUS outpatient work load is offset by an equal increase in military work load (a ratio of 1 to 1), and a high case that assumed a ratio as high as 4 to 1.

By DoD's standard of cost-effectiveness, the increases authorized for medical specialists and obstetricians and gynecologists are too low (see Table 4). Whereas the budget authorizations call for adding 338 such specialists, DoD's study suggests it would be cost-effective to add between 403 and 581. Adjusting the budget authorizations up to reflect the "high" cost-effective additions would raise the total requirement for active-duty physicians who are not in training to about 10,860. In contrast, the increases for general and orthopedic surgery, otolaryngology, ophthalmology, urology, and the hospital-based specialties--mostly specialties in particular demand in wartime--are not cost-effective. The discrepancy presumably reflects the need to maintain medical readiness for war.

The Defense Department's analysis, as the authors of the study acknowledge, is not without its problems. It does not consider all of the added costs of recruiting or retaining additional physicians on active duty. Nor does it consider possible changes in how physicians might

TABLE 4. BUDGET AUTHORIZATIONS COMPARED WITH COST-EFFECTIVE ADDITIONS FOR ACTIVE-DUTY PHYSICIANS IN 1990 UNDER CURRENT POLICY

Specialty	End- Strength in 1988	1990		Cost-Effective	
		Authorization		Additions ^a	
		Number	Required Addition	Low	High
Included in DoD's Analysis ^b					
Medical ^c	4,617	4,838	221	231	402
Surgical ^d	664	888	224	87	165
Orthopedics	342	466	124	27	62
Ophthalmology	164	195	31	11	30
Otolaryngology	142	165	23	41	17
Urology	132	159	27	16	16
Obstetrics/Gynecology	450	567	117	172	179
Subtotal	6,511	7,278	767	585	871
Excluded from DoD's Analysis ^e					
Hospital-Based ^f	1,015	1,244	229	102 ^g	157 ^g
Psychiatry	360	477	117	0	0
Emergency Medicine	234	216	-18	0	0
Aviation/Undersea	1,049	1,085	36	0	0
Administration	326	318	-8	0	0
Subtotal	2,984	3,340	356	102	157
Total	9,495	10,618	1,123	687	1,028

SOURCE: Congressional Budget Office using data on budget authorizations from Department of Defense, *Health Manpower Statistics*, Fiscal Year 1988; and data on cost-effective additions from the Office of the Assistant Secretary of Defense for Program Analysis and Evaluation.

NOTE: These data do not reflect any of the reductions in military manpower now being considered.

- Number of added physician-years; one physician-year is assumed to equal one full-time-equivalent physician. Low case assumes that every decrease in CHAMPUS work load is offset by an equal increase in military work load (1 to 1); high case assumes a ratio as high as 4 to 1.
- Specialties included in the Defense Department's cost-effectiveness analysis.
- Family practice, pediatrics, general medicine, preventive medicine, physical medicine, general internal medicine, dermatology, and neurology.
- General, vascular, thoracic, neurological, and plastic surgery.
- These specialties were not included in the Defense Department's analysis. However, since the hospital-based specialties provide clinical support, CBO assumed that they would have to increase proportionately to any increase in the number of other physicians.
- Anesthesiology, radiology and nuclear medicine, and pathology.
- Estimated assuming any increase in anesthesiologists would be proportionate to the cost-effective increase in general, specialized, and orthopedic surgeons, ophthalmologists, otolaryngologists, and urologists; any increase in radiologists and pathologists would be proportionate to the cost-effective increase in total number of physicians in the specialties included in DoD's analysis.

work. For one thing, any added specialists might regain work load from primary care physicians rather than from the CHAMPUS program. For another, surveys suggest that military physicians want to spend more time on nonpatient activities, such as research and professional learning. Adding physicians to the military might allow them to fulfill this desire, rather than increase the number of patients handled. (These limitations are discussed in Appendix B.)

Finally, it may be possible to regain part of the CHAMPUS work load without spending money on any additional active-duty physicians. Managerial improvements, whether carried out systemwide or within individual facilities, could raise the medical corps' overall productivity. Further improvements in productivity might result from giving military hospitals and clinics extra, relatively inexpensive support staff like nurses, technicians, clerks, and secretaries. Since lack of support staff is a leading reason for dissatisfaction among military physicians, better support might also improve retention and therefore increase the number of experienced, trained physicians.

In view of these limitations, the results of DoD's study are best viewed as tentative. Still, they supply some evidence that the budget authorizations are a reasonable set of requirements, assuming that the number of active-duty personnel remains at roughly today's level.

Experience

One shortcoming of the budget authorizations is that they say nothing about experience. To keep up the quality of its graduate medical education programs, as well as quality of care overall, the medical corps needs a body of experienced physicians. In a 1989 report to the Congress, *Health Professionals Special Pays Study*, the Defense Department proposed an ideal force that profiles the desired distribution of physicians by years of service. The ideal force calls for an increase of almost 50 percent in the proportion of physicians beyond the twelfth year of military service. More precisely, physicians having more than 12 years' service should make up 26 percent of the medical corps; today, they account for 14 percent.

Unfortunately, the Defense Department offered no justification for this particular ideal force, no analytic reason why x percent rather than y percent of the medical corps needs more than so many years of service. Nor did it tie experience to the mix of specialties. Finally, the department neglected any possible relationship between numbers and experience. If physicians become more capable year by year, then a smaller, highly experienced force should be able to supply the same amount of care as a larger, less experienced force. This naturally raises a question (beyond the scope of the present study) of whether the budget authorizations will be able to decline if the proportion of senior physicians increases.

MEETING THE NEEDS OF A SMALLER MILITARY

Drastic political changes in Eastern Europe and the Soviet Union, coupled with the potential for treaties leading to major reductions in weapons, may alter the military medical landscape. Increased warning of a major war could lessen the need for a permanent medical cadre ready to treat casualties in the early stages of a war before the reserves or draftees are mobilized, giving the services greater latitude to base the size and composition of the active-duty medical force on peacetime needs. Indeed, one might envisage current policy changing to allow the active-duty forces enough physicians to provide adequate medical care to a well-defined number of active-duty personnel, retired military personnel, and dependents and survivors.

The number of beneficiaries to be served might well be smaller than today's eligible population. A recent CBO study, *Budgetary and Military Effects of a Treaty Limiting Conventional Forces in Europe* (January 1990), found that political changes, coupled with the North Atlantic Treaty Organization's proposed version of the treaty limiting conventional arms in Europe, could lead to an Army and tactical Air Force with at least 20 percent fewer personnel. Recent studies suggest that changed requirements could permit the military to reduce its size by almost 40 percent by the year 2000.⁶ For the sake of illustration,

6. For example, see William Kaufmann, *Glasnost, Perestroika, and U.S. Defense Spending* (Washington, D.C.: Brookings Institution, 1990).

this report assumes that far-reaching changes in threats to U.S. security could reduce overall requirements for active-duty personnel by one-third.

Building a population-based medical requirement is easier said than done. What is "adequate medical care"? How many beneficiaries will demand this "adequate care" in peacetime? And how productive will physicians be in supplying this care? There is no single, systematic answer to these questions.

Base Requirements on Standards of Health Maintenance Organizations

One approach is to base the requirements for active-duty physicians on the experience of large health maintenance organizations (HMOs). HMOs are generally accepted as a cost-effective way to deliver care to a defined group of beneficiaries. If HMOs served as the Defense Department's model, the military services would have strong incentive to control use of health care services and to deliver services as economically and productively as possible. This approach means that the military would have to make extensive use of appropriate support staff and physician extenders--as do HMOs--to produce care in the most economical manner. (The military already employs large numbers of physician assistants and nurse practitioners--roughly one for every two physicians in family or general practice, pediatrics, and general internal medicine--as well as a large number of certified nurse anesthetists.) It also means that the military would have to contain beneficiaries' use of medical care services: a previous CBO study found that dependents of active-duty personnel visit physicians more extensively and are admitted to hospitals considerably more often than civilians enrolled in HMOs (see *Reforming the Military Health Care System*, January 1988).

HMO-Based Staffing Ratio. A recently published study of seven large HMOs found that in 1983 they employed 111 full-time-equivalent physicians per 100,000 beneficiaries.⁷ Before this staffing ratio can be

7. Robert Mulhausen and Jeanne McGee, "Physician Need: An Alternative Projection from a Study of Large, Prepaid Group Practices," *Journal of the American Medical Association*, vol. 261, no. 13 (April 7, 1989).

compared with the military's, however, it must be adjusted up for differences in age of beneficiaries, use of health care services outside the plan, and employment of hospital-based physicians.⁸ Correcting for these factors raises the ratio to 126 physicians per 100,000 population.⁹

Even with these corrections, the HMO-based standard may still underestimate the true need for physicians. Geography is one reason. The seven HMOs studied were affiliated with the Kaiser Permanente system, and 82 percent of their combined membership of 4.3 million lived in California. Since patterns of medical practice appear to be different in California from the rest of the nation--generally speaking, use of health care services is lighter than average--a standard that relies heavily on California's experience may be too lean as a nationwide measure. Another reason relates to membership in HMOs by people who are healthier than average (selection bias); the evidence from the health care literature suggests that closed-panel, prepaid group practices (the type of HMO organized by Kaiser) generally experience some favorable selection, although many HMOs of this type have no selection bias at all.¹⁰ To the extent that favorable selection exists in HMOs, its effect may be somewhat balanced by the military's screen against medically unfit recruits.

Population. If having 126 physicians per 100,000 beneficiaries is the military's goal, how many beneficiaries will make up the population to be served? About 9.4 million people are eligible to use military hos-

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8. The HMO-based ratio would understate beneficiaries' use of health care services because the HMO population included disproportionately fewer members who were 65 years old or older; they make up about 9 percent of the military's beneficiary population but only about 6 percent of the HMO population. (For HMO data on membership and use, see InterStudy, *National HMO Census: Annual Report on the Growth of HMOs in the US, 1983* (June 30, 1983).) For out-of-plan use, members of the HMO received between 2 percent and 5 percent of their care from outside; and for hospital-based physicians, HMOs favored contract arrangements for anesthesiologists, pathologists, and radiologists and so employed relatively few of those specialists.
 9. The adjustment for hospital-based specialists was based on the per capita standard proposed by the Graduate Medical Education and National Advisory Committee and raised the ratio from 111.2 to 117.6. This ratio was then adjusted by 1.07 for age and out-of-plan use, in line with calculations made by Donald Steinwachs and others, "A Comparison of the Requirements for Primary Care Physicians in HMOs with Projections Made by the GMENAC," *The New England Journal of Medicine*, vol. 314, no. 4 (January 23, 1986).
 10. Harold Luft and Robert Miller, "Patient Selection in a Competitive Health Care System," *Health Affairs* (Summer 1988).

pitals and clinics, including 2.3 million members of the uniformed services (2.1 million in the Army, Navy, Marine Corps, and Air Force; the rest in the Coast Guard, Public Health Service, National Oceanic and Atmospheric Administration, and the National Guard) and their 3 million dependents. The rest include retired military personnel and their dependents and survivors. However, not all beneficiaries depend on military physicians, particularly if they live outside the catchment areas: about 1.3 million dependents and retired military personnel live further than 40 miles from a military treatment facility. The total number of active-duty personnel and nonactive-duty beneficiaries living inside catchment areas or overseas is therefore about 8.2 million. Reduce the active-duty forces by one-third, as assumed here for the sake of illustration, and the size of the population to be served in peacetime would decline by one-fifth to 6.6 million.

Number of Military Physicians

With a population of 6.6 million, the military health care system would provide an estimated 140 physicians per 100,000 beneficiaries. To get down to the HMO-based ratio of 126 physicians, it would need 1,050 (or 11 percent) fewer active-duty physicians than were in the medical corps in 1988, for a total medical work force of roughly 8,450 physicians (see Table 5).

The estimated ratio of 140 physicians per 100,000 beneficiaries recognizes several key differences between the work forces of the military and the HMOs. First, it excludes from active-duty end strengths about 400 military physicians who are neither care-givers nor administrators. Second, it assumes that each medical resident is only 35 percent as productive as a full-time-equivalent physician (an assumption made by the Graduate Medical Education and National Advisory Committee). If residents were instead assumed to be more capable--an accepted rule of thumb within DoD is that an average resident is half as productive as other physicians--then the ratio would be higher, and the new requirement would be lower than 8,450. Third, because all military personnel face unique demands to be ready for war, the estimate

TABLE 5. REQUIREMENTS FOR ACTIVE-DUTY PHYSICIANS FOR A SMALLER MILITARY USING STANDARDS OF HOSPITAL MAINTENANCE ORGANIZATIONS

	End Strength in 1988 ^a	HMO-Based Requirement	
		Number ^b	Change
Medical			
Primary ^c	3,792	2,970	-820
Specialized ^d	825	920	100
Surgical ^e	1,006	670	-340
Surgical-Related ^f	438	470	30
Obstetrics/Gynecology	450	690	240
Hospital-Based ^g	1,015	1,050	40
Psychiatric	360	360	0
Other ^h	1,283	1,190	-90
Administrative	326	130	-200
Total	9,495	8,450	-1,040

SOURCE: Congressional Budget Office based on data from Robert Mulhausen and Jeanne McGee, "Physician Need: An Alternative Projection from a Study of Large, Prepaid Group Practices," *Journal of the American Medical Association*, vol. 261, no. 13 (April 7, 1989).

- a. Includes only physicians not in training.
- b. Number of physicians needed to meet the HMO-based standard of 126 physicians per 100,000 beneficiaries. Population includes all active-duty personnel and nonactive-duty beneficiaries living overseas or inside catchment areas. Estimates of the military ratio include 465 full-time-equivalent civilian physicians, less than half the number employed in 1988.
- c. General and family practitioners, general internists, pediatricians, physical and preventive medicine specialists.
- d. Internal medical specialists, dermatologists, cardiologists, neurologists.
- e. General and specialty surgeons, orthopedic surgeons.
- f. Ophthalmologists, otolaryngologists, urologists.
- g. Anesthesiologists, pathologists, radiologists.
- h. Specialists in aviation, undersea, and emergency medicine.

assumes that military physicians are only 95 percent as productive as their colleagues in HMOs.¹¹ Finally, the estimate includes specialists in aviation and undersea medicine--physicians caring primarily for active-duty personnel--as one-fifth-time providers.

Civilian physicians represent another complication. Data published by the Defense Department show the services employing 930 full-time-equivalent civilian physicians. (This figure is an underesti-

11. Military physicians spend time in special training programs or on deployment, time taken away from treating beneficiaries. According to a survey of physicians in 1984, nonmedical military activities took up about 9 hours a month of the average physician's time. Assuming that the typical time lost to various readiness requirements has increased to 10 hours a month, then military activities make up 5 percent of a 48-week, 55 hours-per-week year.

mate because it includes neither part-time physicians in the Navy nor civilian physicians in the services' PRIMUS clinics--civilian-run clinics that provide a wide range of primary care services.) The extent to which civilian physicians should count toward meeting an HMO-based standard is uncertain. Should the active-duty requirement assume a constant number of civilian providers, or should it assume some substitution between military physicians and civilian physicians? Over the last five years, the services have varied civilian physicians in inverse proportion to the number of military physicians not in training, but the number of civilians never dipped below 700. The estimated staffing ratio assumes that the services will lay off one-half of their civilian physicians before cutting back on the number of active-duty physicians.

Medical Specialties

How might the 8,450 physicians required to maintain a physician/beneficiary ratio of 126 to 100,000 be allocated by specialty? For more insight into the distribution, CBO compared the 1988 active-duty force with staffing in HMOs (see Table 6). The military's staffing pattern generally is similar to that of the HMOs. It uses proportionally more primary care physicians and proportionally fewer nonsurgical specialists, but the differences are not enormous. Three specialties stand out from this pattern: surgery, administration, and psychiatry.

By HMO standards, too many surgeons serve on active duty. Whereas surgeons make up about 9 percent of the HMO work force, they account for more than 12 percent of the military's medical work force. Similarly, the military uses too many physicians as administrators; the proportion of physicians in administrative positions in the military is twice as high as in HMOs, largely because of the military's extensive system of facilities. Most of the military's physician administrators are in command of a hospital or freestanding clinic. To meet HMO standards, the military would therefore have to assign many more nonphysicians--most likely from the medical service corps--to command posts. (In fact, the Defense Appropriations Act of 1990 moves in the direction of having fewer physicians as administrators, at least in the Navy; it directs that service to reduce by 10 percent the number of physicians in administrative positions by the

middle of 1990). Finally, the military uses proportionally more psychiatrists, but this may be attributable more to HMOs' restrictive benefits for chronic mental illnesses than to any overstaffing in the military. For this reason, the estimates in Table 5 assume no change in the number of psychiatrists on active duty, even though their numbers would decline under a strictly applied HMO-based standard.

TABLE 6. PERCENTAGE DISTRIBUTION OF PHYSICIANS BY SPECIALTY IN LARGE HEALTH MAINTENANCE ORGANIZATIONS AND IN THE MILITARY MEDICAL CORPS

Specialty	Military	HMO	Ratio Military/HMO
Primary Care			
Family/general practice	27	10	2.7
Pediatrics	9	13	0.7
General internal medicine	8	17	0.5
Total	44	40	1.1
Surgery (General, specialty, orthopedic)	12	9	1.3
Surgery-Related (Ophthalmology, otolaryngology, urology)	5	7	0.7
Obstetrics/Gynecology	6	9	0.7
Nonsurgical Specialties (Internal medicine, neurology, dermatology)	10	12	0.8
Psychiatry	4	3	1.3
Emergency Medicine	3	4	0.8
Hospital-Based (Radiology, anesthesiology, pathology)	12	14	0.9
Administration (Executive medicine in the military)	4	2	2.0

SOURCE: Congressional Budget Office based on data from Robert Mulhausen and Jeanne McGee, "Physician Need: An Alternative Projection from a Study of Large, Prepaid Group Practices," *Journal of the American Medical Association*, vol. 261, no. 13 (April 7, 1989); and Department of Defense, *Health Manpower Statistics*, Fiscal Year 1988.

NOTE: To aid comparison with HMOs, the denominator for the military excludes specialists in aviation, preventive, and undersea medicine, and therefore equals 8,210.

CONCLUSION

Current defense policy blends two criteria to decide the size of the active-duty medical corps. In order of priority, they are wartime readiness and peacetime cost-effectiveness. Wartime needs demand a heavy concentration of surgeons and anesthesiologists; peacetime needs demand proportionally more specialists in primary care medicine and obstetrics. The services' budget authorizations reconcile these competing demands within present constraints on funding. When modified to reflect the results of a recent cost-effectiveness analysis--albeit one containing several flaws--the budget authorizations call for a medical force of 10,860 active-duty physicians, 14 percent above the number on duty at the end of 1988.

The requirement for 10,860 physicians rests on an active-duty force of 2.1 million men and women. If budgetary and diplomatic pressures bring about a reduction in the active-duty force, the services may not only need fewer physicians but may also be able to reshape the medical corps to serve the needs of a well-defined active-duty and civilian population. Based on staffing practices in large health maintenance organizations, the military might need only 8,450 active-duty physicians, 11 percent below current staffing. The composition of the force by specialty would shift away from surgeons in favor of specialists in internal medicine and obstetrics/gynecology.

CHAPTER III

ANALYSIS OF ALTERNATIVE

PLANS FOR PAY

Last year the Congress passed major increases in military medical pay. The 1990 defense authorization, which made the changes, will have a significant, positive effect on the supply of active-duty physicians not only because it increased the across-the-board special pays (variable special pay, additional special pay, and board-certified pay), but because it allows future increases in incentive special pay.

Nevertheless, discussion about military medical pay will continue for several years. Medical officer retention bonuses are slated to end next year, thereby making an issue of tying hikes in pay to a commitment for two or more years of additional military service. Potential reductions in requirements for active-duty physicians may raise questions about the need for any hikes in pay.

This chapter looks at four approaches to revising military medical pay. The first two--allowing the medical officer retention bonus to end under current policy, or continuing to pay some form of multiyear bonus--are consistent with a desire to raise the number of physicians on active duty somewhat above the level of the 1990 budget authorizations. Such an increase might be sensible even if reduced world tensions permit a cut in the total number of active-duty personnel. The second two--freezing medical pay, or holding pay at real 1990 levels--are consistent with a decision to reduce the number of active-duty physicians, a reduction that could occur if the total size of the military is reduced.

PROJECTING EFFECTS

To judge the alternative pay raises, this report focuses on the steady-state size of the medical corps under each pay plan. When the net effect of all projected gains and losses in personnel is one of "no change,"

then the manpower system can be said to be in a steady state. All the projections in this chapter are for such a steady state.

To get to the steady state, the projections start with patterns of retention in fiscal year 1988. Retention is expressed as a rate--the number of physicians on duty at the beginning of 1988 divided into the number of physicians who stayed during 1988--that varies by years of service. Using these rates, it is possible to estimate the probability that a new physician (an accession) will stay in the military for one year, for two years, for three years, and so on, all the way up to 30 years. Based on these patterns, a steady number of accessions over the next 30 years will eventually generate a steady work force of physicians having up to 30 years of service; the projections do not include physicians who are in training, namely interns, residents, and fellows.

For all but one option (holding pay at real 1990 levels), the projections assume a constant flow of 1,400 physicians a year into the military medical work force--the number needed to maintain each specialty's 1988 end strength, based on 1988 retention rates and pay scales. (It also happens to be very close to the number of physicians and physician-trainees who actually came on active duty in fiscal year 1987.) In other words, if 1,400 physicians a year join the military, year after year, eventually there will be about 9,200 active-duty physicians, approximately the number on active duty at the end of 1988 (excluding administrators).

This analysis assumes that military physicians base their decisions to stay or leave on a comparison of their military earnings and their average civilian alternatives (defined here by net mean incomes). As the relative value of military pay increases, physicians become more willing to stay on active duty, and projected retention rates rise from 1988 levels. Changes in the relative value of military pay are estimated for 14 separate military specialties. (For clarity, the projections are combined into seven broad groups of specialties.)¹ Unless

1. They are (1) *Primary care*--family and general practice, general internal medicine, general pediatrics, preventive and physical medicine, neurology, (2) *Nonsurgical specialty*--dermatology, cardiology, other internal medical and pediatric subspecialties, (3) *Surgical*--general and specialized surgery, orthopedic surgery, (4) *Surgical-related*--ophthalmology, otolaryngology, urology, (5) *Obstetrics/ gynecology*, (6) *Hospital-based*--anesthesiology, radiology, nuclear medicine, pathology, and (7) *Other*--psychiatry, emergency medicine, aviation medicine, undersea medicine.

noted otherwise, all types of military pay are assumed to hold their real values. Thus, a 10 percent improvement in military pay today will remain a 10 percent gain into the steady state.

The relationship between pay and behavior is expressed by an "elasticity," the percentage change in retention rates with respect to a percentage change in relative pay. For physicians who are just ending their first obligation, the elasticity with respect to pay is estimated to be 0.60; that is, a 10 percent increase in military pay will cause a 6 percent rise in the rate of retention. This estimate results from a statistical analysis of a cohort of physicians who joined the military in 1981 (details appear in Appendix A).

Less is certain about physicians' long-term behavior after the first obligation. A given percentage change in pay will probably produce a much smaller percentage change in retention among the more experienced members of a force, but empirical estimates for medical officers are lacking. Research on military retention in the enlisted forces suggests that the more years of service an individual has accumulated, the smaller is the effect that changes in pay will have on that individual's decision about whether to stay in or leave the military; military personnel past their initial term may be at most only one-third as responsive to changes in pay as those just finishing their first term. Reflecting the uncertainty, the model uses two alternative assumptions about elasticities after the first obligation: (1) a high assumption, that they are one-third as large (or 0.20), and (2) a low assumption, that they are one-sixth as large (or 0.10).

OPTIONS FOR A LARGER MEDICAL CORPS

If the Congress wants 10,860 physicians on active duty--the 1990 budget authorizations, adjusted up to reflect possible cost-effective additions--then it will probably need to increase medical special pay. It could do so either by continuing current pay policy, which permits such an increase, or by changing current policy to tie some of the increased special pay to a commitment for two or more years of added active-duty service. Table 7 depicts the effect each alternative would have on the

pay of typical family practitioners and surgeons, two types of physicians representing opposite ends of the earnings range.

Continue Current Policy

Current policy rests on the provisions of the 1990 defense authorization. The medical officer retention bonus, which began in 1989 and

TABLE 7. MEDICAL SPECIAL PAYS OF TYPICAL MILITARY PHYSICIANS IN 1988 AND UNDER ALTERNATIVE PAY OPTIONS FOR YEARS BEYOND 1990
(In thousands of dollars)

	Across-the-Board Pays				Targeted Pays				Maximum Possible Medical Pay
	Single-Year	Multiyear			Single-Year	Multiyear			
	(VSP + ASP + BCP)	Two	Three	Four	(ISP)	Two	Three	Four	
Rates in 1988 (Current dollars)									
Family Practitioner	21.5	0	0	0	0	0	0	0	21.5
Surgeon	21.5	0	0	0	8.0	0	0	0	29.5
Long-Run Rates Under Options for a Larger Medical Corps (1990 dollars)									
Continue Current Policy									
Family practitioner	29.5	0	0	0	8.0	0	0	0	37.5
Surgeon	29.5	0	0	0	36.0	0	0	0	65.5
Continue Special Pays for Multiyear Commitments									
Family practitioner	29.5	0	0	0	0	1.5	3.0	8.0	37.5
Surgeon	29.5	0	0	0	16.0	10.0	15.0	20.0	65.5
Pay a Flat Multiyear Bonus Regardless of Specialty									
Family practitioner	29.5	2.0	4.0	8.0	0	0	0	0	37.5
Surgeon	29.5	2.0	4.0	8.0	16.0	0	0	0	53.3
Long-Run Rates Under Options for a Smaller Medical Corps (1990 dollars)									
Freeze Pay for Five Years									
Family practitioner	24.2	0	0	0	0	0	0	0	24.2
Surgeon	24.2	0	0	0	13.2	0	0	0	37.4
Hold Pay at Real 1990 Levels									
Family practitioner	29.5	0	0	0	0	0	0	0	29.5
Surgeon	29.5	0	0	0	16.0	0	0	0	45.5

SOURCE: Congressional Budget Office.

NOTES: Projections assume a board-certified physician who is not in training and has 10 years of creditable service.

VSP = variable special pay; ASP = additional special pay; BCP = board-certified pay; ISP = incentive special pay.

requires physicians to stay for two, three, or four more years to get a pay hike, will end after 1990. In its place, the services will be allowed to increase incentive special pay up to the amount of a four-year MORB payment. For example, surgeons who agree to stay in the military for four more years now get a \$20,000 bonus on top of \$16,000 in incentive special pay (\$10,000 if they have less than six years' experience). Under current policy, surgeons will get \$36,000 (or \$30,000) in incentive special pay. Physicians in specialties that qualify for a MORB but not for incentive special pay--including family practice, pediatrics, neurology, pathology, and internal medicine--will get at least \$8,000 in incentive special pay.

The higher amounts of incentive special pay will ensure strong growth in the medical corps. The CBO projection shows the number of physicians neither in training nor in administration rising to either 10,610 (1,410 added physicians, over and above the 1988-based end strengths) or 11,420 (2,220 added physicians), depending on physicians' responsiveness to changes in pay. Moreover, the proportion of working physicians with more than 12 years of military medical service would rise from today's 19 percent to either 27 percent or 31 percent (in line with the proportion considered ideal by the Defense Department).

Increases would extend across all medical fields. Surgery enjoys the largest projected percentage increase over 1988, and primary care the smallest. Even so, the projected number of primary care physicians is at least 110 percent of 1988 strengths.

As discussed in Chapter II, the services need 10,540 physicians (not counting 320 physicians as administrators)--1,365 more than were actually on duty at the end of 1988. The CBO projections show that current policy will eventually ease or solve most specialty shortages (see Table 8, which compares the projected effects with requirements that are based on the services' budget authorizations). Regardless of assumptions about senior physicians, there will be enough nonsurgical and surgical-related specialists to satisfy requirements. If senior physicians are relatively responsive to changes in pay, there will be enough surgical, primary, and hospital-based specialists; if not, the services may fall somewhat short of meeting requirements in those

areas. Only one specialty, obstetrics/gynecology, stands out as failing to meet at least 90 percent of its requirement.

Spending on medical special pays will rise considerably under current policy. In 1990, medical special pays will cost the Defense Department about \$372 million. In the long run, current policy will raise annual spending on these pays (in constant 1990 dollars) to either \$454 million or \$509 million. Other personnel expenses, namely the basic

TABLE 8. PROJECTED STEADY-STATE EFFECTS OF CONTINUING CURRENT PAY POLICY COMPARED WITH BUDGET-AUTHORIZED STANDARDS

Specialty	Require-ments ^a	Baseline ^b			Projected Effects ^c					
		End Strength	Percentage of Require-ments Met	Medical Special Pays ^d	End Strength		Percentage of Require-ments Met		Medical Special Pays ^d	
					High	Low	High	Low	High	Low
Primary	4,090	3,640	89	93	4,240	4,020	104	98	157	132
Nonsurgical										
Specialty	930	990	106	25	1,240	1,140	133	123	54	49
Surgical	1,350	1,010	75	31	1,480	1,290	110	96	90	78
Surgical-Related	520	440	85	11	580	530	112	102	33	30
Obstetrics/ Gynecology	630	450	71	13	550	520	87	83	32	31
Hospital-Based	1,240	1,020	82	29	1,240	1,160	100	94	61	57
Other	<u>1,780</u>	<u>1,650</u>	93	<u>40</u>	<u>2,090</u>	<u>1,950</u>	117	110	<u>82</u>	<u>77</u>
Total ^e	10,540	9,200	87	242	11,420	10,610	108	101	509	454

SOURCE: Congressional Budget Office.

NOTE: *Primary* includes family and general practice, general pediatrics, physical and preventive medicine, neurology, and general internal medicine; *Nonsurgical specialty* includes dermatology, cardiology, and other internal medical and pediatric subspecialties; *Surgical* includes general, orthopedic, and specialized surgery; *Surgical-related* includes otolaryngology, ophthalmology, and urology; *Hospital-based* includes anesthesiology, radiology and nuclear medicine, and pathology; and *Other* includes aviation and undersea medicine, emergency medicine, and psychiatry.

- Based on the 1988-approved budget authorizations for 1990, adjusted up to reflect the effects of the Defense Department's cost-effectiveness analysis.
- End strengths and costs are estimated by extrapolating 1988 rates of pay and retention into the steady state.
- The high case assumes that physicians past the initial obligation are one-third as responsive to changes in pay as physicians at the initial obligation; the low case, one-sixth as responsive.
- In millions of 1990 dollars.
- Excludes physicians in administration and in training (interns, residents, and fellows).

pay and allowances all military officers receive, will increase hardly at all. The Defense Department now spends more than half a billion dollars a year on physicians' basic pay and allowances, out of a total budget for officers' pays and allowances of roughly \$18.6 billion. That total budget will stay at or about \$18.6 billion if the department adds physicians to the active-duty force without increasing overall end strengths. (The remaining analyses of options in this report focus on the costs of medical special pay, rather than total compensation.)

Relative to the steady-state baseline--calculated by projecting 1988 retention rates and pay levels beyond 1990--current policy would cost an additional \$212 million to \$267 million a year. Since the lower increase is associated with an added 1,410 physicians, it amounts to an average marginal cost per additional physician of about \$150,000. The higher increase, associated with an increase of 2,220 physicians, produces an average marginal cost of \$120,000.

To put these marginal costs in perspective, the starting military pay for a board-certified surgeon who enters service as a major is about \$70,000. It may therefore be more economical to recruit extra volunteer physicians than to retain more physicians through higher incentive special pay. (It is unlikely, however, that the services could recruit large numbers of such well-qualified volunteers without offering substantial monetary inducements over and above current starting pay.) Moreover, the marginal costs of continuing current policy may exceed DoD's implied threshold for cost-effectiveness. Under one scenario (as discussed in Appendix B), when the marginal cost per additional physician is greater than \$99,000, the estimated savings in CHAMPUS dollars will be outweighed by the added costs of medical special pay. Thus, it might not be cost-effective to retain additional physicians with higher incentive special pay.

Continue Special Pays for Multiyear Commitments

If high marginal costs are a concern, but the Congress wants a pay plan that supports about 10,500 physicians in the medical work force, then it might want to base some part of medical pay on a commitment to

remain in the military for several years. This study considers two variations on a multiyear theme.

One possibility would be to hold incentive special pay at current levels and continue the medical officer retention bonus (MORB) beyond 1990 when it is scheduled to end. All physicians who agree to stay for four years would get between \$8,000 and \$20,000 a year on top of any incentive special pay, with surgeons getting the highest payments. General medical officers would still not be eligible for a MORB.

Payments under the MORB vary significantly by specialty, reflecting the range of earnings among civilian physicians. Although this makes economic sense, some critics of the MORB fear that wide differences among the various specialties could stir divisive feelings. Rather than vary the payments for a multiyear commitment by specialty, they might prefer to pay a single amount across the board.

The second variation, mentioned as a possible option in the report accompanying the 1990 defense authorization, would allow the MORB to end in 1990 and instead offer all specialists \$2,000 a year for a two-year contract, \$4,000 a year for a three-year contract, and \$8,000 a year for a four-year contract (while holding incentive special pay at current levels). This would represent a slight improvement over the MORB for about 45 percent of the military's physicians not in administration or training, including specialists in primary care, neurology, psychiatry, pathology, and aviation medicine. It would be a substantial improvement for the military's 1,200 general medical officers (physicians who have not trained for a specialty), because they are now ineligible for a MORB. For the rest of the military's physicians, from anesthesiologists to urologists, this single payment for a multiyear commitment would be less generous than the MORB.

Possible Effects of Bonuses. Since multiyear bonuses are a comparatively new form of pay, their possible effectiveness is open to question. They might have no effect; that is, they may hold no appeal to physicians who had planned to leave and may go only to those physicians who would have stayed anyway. More positively, linking bonuses with a multiyear commitment may have two other effects:

- o A "shift" effect--though they may not encourage additional physicians to stay, multiyear bonuses might encourage those who had planned on staying to stay longer; or
- o A "retention" effect--not only would physicians stay longer, but more of them would stay.²

It is too soon to tell which effect is most likely. However, the preliminary evidence from 1989 does not reject the possibility of a shift effect. If the only physicians who had taken a MORB had 16 or more years of service (four years short of retirement eligibility), one might reasonably conclude that the MORB was having no practical effect. Instead, physicians at all years of service favored the four-year MORB.

Analysts in the Defense Department and CBO will evaluate the effects of multiyear bonuses on the basis of data from 1989 and 1990. In the meantime, this report bounds the range of possible outcomes by projecting the MORB's effect under three assumptions: no effect, a shift effect, and a shift and retention effect.³

Extend the MORB. If the multiyear bonuses have no effect, then extending the current version of the MORB will of course not solve the services' shortages of physicians. If the bonuses prompt physicians who planned on staying to stay longer (a shift effect), extending the MORB will have roughly the same effect as current policy but at lower cost. If, in addition, the bonuses encourage more physicians to stay (a retention effect), this option will clearly outperform current policy.

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2. These terms are taken from a RAND Corporation analysis of reenlistment among enlisted personnel. RAND partitioned the increase in person-years caused by an increase in bonuses into a shift effect and a retention effect. More of the bonus effect on person-years came from the shift effect than the retention effect. James Hosek and Christine Peterson, *Reenlistment Bonuses and Retention Behavior* (Santa Monica: RAND Corporation, March 1985).
 3. At the time of CBO's analysis, the Defense Department had not yet released its evaluation of the MORB's effect in 1989. For a number of reasons, the data from 1989 are not likely to be definitive. First, junior physicians tend to line up civilian jobs well before their initial obligation ends. Thus, for many physicians whose obligation ended in 1989, the MORB may have appeared too late to affect their decisions. Second, the MORB went through a turbulent start-up period--first excluding most primary care specialists, then including them--that may have left physicians skeptical about participating in such a program. Finally, eligibility for the MORB was stricter in 1989 than it is today.

TABLE 9. PROJECTED STEADY-STATE EFFECTS OF EXTENDING THE MEDICAL OFFICER RETENTION BONUS

Specialty	Require- ments ^a	Baseline ^b		Projected Effects ^c						
		End Strength	Percentage of Require- ments Met	Medical Special Pays ^d	End Strength		Percentage of Require- ments Met		Medical Special Pays ^d	
					High	Low	High	Low	High	Low
Shift Effect ^e										
Primary	4,090	3,640	89	93	4,380	4,290	107	105	151	148
Nonsurgical										
Specialty	930	990	106	25	1,130	1,100	122	118	42	41
Surgical	1,350	1,010	75	31	1,280	1,220	95	90	66	62
Surgical-Related	520	440	85	11	560	530	108	102	28	26
Obstetrics/ Gynecology	630	450	71	13	590	570	94	90	29	28
Hospital-Based	1,240	1,020	82	29	1,240	1,210	100	97	54	53
Other	<u>1,780</u>	<u>1,650</u>	93	<u>40</u>	<u>2,100</u>	<u>2,030</u>	118	114	<u>78</u>	<u>75</u>
Total ^f	10,540	9,200	87	242	11,280	10,950	107	104	448	433
Shift and Retention Effects ^g										
Primary	4,090	3,640	89	93	4,500	4,390	110	107	155	152
Nonsurgical										
Specialty	930	980	106	25	1,190	1,150	128	124	45	43
Surgical	1,350	1,010	75	31	1,370	1,300	101	96	71	67
Surgical-Related	520	440	85	11	580	550	112	106	30	28
Obstetrics/ Gynecology	630	450	71	13	610	590	97	94	30	29
Hospital-Based	1,240	1,020	82	29	1,300	1,260	105	102	57	55
Other	<u>1,780</u>	<u>1,650</u>	93	<u>40</u>	<u>2,210</u>	<u>2,120</u>	124	119	<u>82</u>	<u>79</u>
Total ^f	10,540	9,200	87	242	11,760	11,360	112	108	470	453

SOURCE: Congressional Budget Office.

NOTE: *Primary* includes family and general practice, general pediatrics, physical and preventive medicine, neurology, and general internal medicine; *Nonsurgical specialty* includes dermatology, cardiology, and other internal medical and pediatric subspecialties; *Surgical* includes general, orthopedic, and specialized surgery; *Surgical-related* includes otolaryngology, ophthalmology, and urology; *Hospital-based* includes anesthesiology, radiology and nuclear medicine, and pathology; and *Other* includes aviation and undersea medicine, emergency medicine, and psychiatry.

- Based on the 1988-approved budget authorizations for 1990, adjusted up to reflect the effects of the Defense Department's cost-effectiveness analysis.
- End strengths and costs are estimated by extrapolating 1988 rates of pay and retention into the steady state.
- The high case assumes that physicians past the initial obligation are one-third as responsive to changes in pay as physicians at the initial obligation; the low case, one-sixth as responsive.
- In millions of 1990 dollars.
- Assumes that the multiyear pay will induce physicians who would otherwise have stayed in the military to stay for longer lengths of service.
- Excludes physicians in administration and in training (interns, residents, and fellows).
- Assumes that the multiyear pay will produce a shift effect (see note e) and will also induce physicians to stay in service who would otherwise have left.

A shift effect, shown in Table 9, will lead eventually to between 10,950 and 11,280 active-duty physicians, virtually the same as if current policy continues. Yet total steady-state costs for medical special pays would be lower, perhaps up to \$61 million lower, thus bringing the marginal cost per added physician down to between \$99,000 and \$109,000 (compare Tables 8 and 9). The proportion of physicians having more than 12 years of service would rise to about 31 percent. Most specialties would meet their budget-authorized requirements. In contrast with continuing current policy, however, extending the MORB may not attract enough surgeons if senior physicians are relatively unresponsive to pay changes.

With a retention effect and a shift effect, the projected number of physicians ranges between 11,360 and 11,760 (see Table 9). If responsiveness to pay changes is high, extending the MORB would satisfy the requirement of each specialty except for obstetrics/gynecology, and that specialty would meet 97 percent of its requirements. Although the number of physicians on active-duty would be higher than under current policy, total costs would be as much as \$40 million lower. The combination of high effects and low costs yields a relatively low average marginal cost of about \$89,000 (below the estimated threshold for cost-effectiveness; see Appendix B for details). If responsiveness to changes in pay is lower, then extending the MORB will cost more in total than continuing current policy, but its average marginal cost will be several thousand dollars less.

Pay a Flat Multiyear Bonus Regardless of Specialty. Like the medical officer retention bonus, a multiyear bonus available to any physician who makes a commitment of two, three, or four years could solve many of the services' shortages at relatively low marginal cost. However, it may fail to meet requirements for surgeons and hospital-based specialists--physicians who command the highest potential civilian earnings. The projections in Table 10 illustrate the problem. Limiting the multiyear bonus to \$8,000 would pose no problem for meeting the goals for the primary care specialists; indeed, their projected numbers exceed those under the MORB. It would, however, pose problems for the surgical specialties. Even if a shift effect and a retention effect

TABLE 10. PROJECTED STEADY-STATE EFFECTS OF PAYING A FLAT MULTIYEAR BONUS

Specialty	Require- ments ^a	Baseline ^b			Projected Effects ^c				Medical Special Pays ^d	
		End Strength	Percentage of Require- ments Met	Medical Special Pays ^d	End Strength		Percentage of Require- ments Met		High	Low
					High	Low	High	Low		
Shift Effect ^e										
Primary	4,090	3,640	89	93	4,660	4,570	114	112	164	161
Nonsurgical										
Specialty	930	990	106	25	1,110	1,080	119	116	38	37
Surgical	1,350	1,010	75	31	1,230	1,170	91	86	55	52
Surgical-Related	520	440	84	11	550	520	106	100	26	24
Obstetrics/ Gynecology	630	450	72	13	550	540	87	87	26	25
Hospital-Based	1,240	1,020	82	29	1,220	1,200	98	97	50	49
Other	<u>1,780</u>	<u>1,650</u>	93	<u>40</u>	<u>2,100</u>	<u>2,030</u>	118	114	<u>78</u>	<u>75</u>
Total ^f	10,540	9,200	87	242	11,420	11,110	108	105	437	423
Shift and Retention Effects ^g										
Primary	4,090	3,640	89	93	4,850	4,740	119	116	170	166
Nonsurgical										
Specialty	930	990	106	25	1,130	1,100	122	118	39	38
Surgical	1,350	1,010	75	31	1,250	1,190	93	88	56	54
Surgical-Related	520	440	84	11	560	530	108	102	26	24
Obstetrics/ Gynecology	630	450	72	13	570	550	90	88	27	26
Hospital-Based	1,240	1,020	82	29	1,260	1,230	102	99	51	50
Other	<u>1,780</u>	<u>1,650</u>	93	<u>40</u>	<u>2,210</u>	<u>2,120</u>	124	119	<u>82</u>	<u>79</u>
Total ^f	10,540	9,200	87	242	11,830	11,460	112	109	451	437

SOURCE: Congressional Budget Office.

NOTE: *Primary* includes family and general practice, general pediatrics, physical and preventive medicine, neurology, and general internal medicine; *Nonsurgical specialty* includes dermatology, cardiology, and other internal medical and pediatric subspecialties; *Surgical* includes general, orthopedic, and specialized surgery; *Surgical-related* includes otolaryngology, ophthalmology, and urology; *Hospital-based* includes anesthesiology, radiology and nuclear medicine, and pathology; and *Other* includes aviation and undersea medicine, emergency medicine, and psychiatry.

- Based on the 1988-approved budget authorizations for 1990, adjusted up to reflect the effects of the Defense Department's cost-effectiveness analysis.
- End strengths and costs are estimated by extrapolating 1988 rates of pay and retention into the steady state.
- The high case assumes that physicians past the initial obligation are one-third as responsive to changes in pay as physicians at the initial obligation; the low case, one-sixth as responsive.
- In millions of 1990 dollars.
- Assumes that the multiyear pay will induce physicians who would otherwise have stayed in the military to stay for longer lengths of service.
- Excludes physicians in administration and in training (interns, residents, and fellows).
- Assumes that the multiyear pay will produce a shift effect (see note e) and will also induce physicians to stay in service who would otherwise have left.

materialize, the services would not meet their requirements for surgeons--or for obstetricians and gynecologists. If only a shift effect occurs, there is no chance of meeting these groups' requirements.

Be that as it may, paying a multiyear bonus regardless of specialty would raise medical strengths well above their 1988 levels at comparatively low cost. The number of surgeons, for example, would increase at least 16 percent over 1988-based end strengths. For the medical corps as a whole, the projected number of active-duty physicians varies between 11,100 and 11,800, well above the 1988-based end strength of 9,200. As for costs under this option, spending on medical special pays would amount to, at most, \$450 million a year: \$20 million lower than the projected maximum cost associated with extending the MORB, and \$60 million lower than the cost associated with current policy.

OPTIONS FOR A SMALLER MEDICAL CORPS

So long as the armed forces need more than 10,000 active-duty physicians, they will need continued increases in medical special pay. Reduced requirements could challenge that need. Chapter II described how a reduced defense budget could lead to a peacetime-based requirement for about 8,320 physicians (not counting administrators). Measured against this lowered need, the options analyzed above might all produce too large a force of physicians (see Table 11).

Surgeons would be in particular abundance. Under current policy, the services are projected to have twice as many surgeons as they could use in peacetime. Even under the option for a multiyear bonus for which all physicians would be eligible, which is relatively frugal, there would be an excess of surgeons (assuming a shift effect). With the exception of obstetrics/gynecology, the specialties would all have more than 100 percent of their peacetime-based requirements.

Pay Raises and Reduced Requirements

In light of these projected effects, does it make sense to give physicians continued raises? Or might it be better to reduce military medical pay, perhaps by freezing present rates of pay and allowing inflation to reduce its real value? Both approaches have their arguments.

TABLE 11. PROJECTED STEADY-STATE EFFECTS OF CURRENT POLICY AND MULTIYEAR ALTERNATIVES COMPARED WITH REQUIREMENTS FOR A SMALLER MILITARY

Specialty	Require- ments ^a	Percentage of Requirement				
		Continue Current Policy	Extend the MORB		Pay Multiyear Bonus	
			Shift Effect	Retention Effect	Shift Effect	Retention Effect
Higher Responsiveness to Changes in Pay ^b						
Primary	2,800	151	156	161	166	173
Nonsurgical Specialty	1,090	114	104	109	102	104
Surgical	670	221	192	205	183	186
Surgical-Related	470	123	119	124	117	119
Obstetrics/Gynecology	690	80	85	88	80	82
Hospital-Based	1,050	118	118	124	116	120
Other	<u>1,550</u>	135	136	143	136	143
Total ^c	8,320	137	136	141	137	142
Lower Responsiveness to Changes in Pay ^d						
Primary	2,800	144	153	157	163	169
Nonsurgical Specialty	1,090	105	101	106	99	101
Surgical	670	193	182	194	174	178
Surgical-Related	470	113	113	117	110	112
Obstetrics/Gynecology	690	75	83	86	78	80
Hospital-Based	1,050	110	115	120	114	117
Other	<u>1,550</u>	126	131	137	131	137
Total ^c	8,320	127	132	136	134	138

SOURCE: Congressional Budget Office.

NOTE: *Primary* includes family and general practice, general pediatrics, physical and preventive medicine, neurology, and general internal medicine; *Nonsurgical specialty* includes dermatology, cardiology, and other internal medical and pediatric subspecialties; *Surgical* includes general, orthopedic, and specialized surgery; *Surgical-related* includes otolaryngology, ophthalmology, and urology; *Hospital-based* includes anesthesiology, radiology and nuclear medicine, and pathology; and *Other* includes aviation and undersea medicine, emergency medicine, and psychiatry.

- Based on staffing standards of health maintenance organizations for a peacetime population of 6.6 million beneficiaries.
- Assumes that physicians past the initial obligation are one-third as responsive to changes in pay as physicians at the initial obligation.
- Excludes physicians in administration and in training (interns, residents, and fellows).
- Assumes that physicians past initial obligation are one-sixth as responsive to changes in pay as physicians at the initial obligation.

Despite substantial increases in pay since 1988, many active-duty physicians still earn less than their civilian counterparts. Under current policy, a typical military surgeon (a board-certified lieutenant colonel with 12 years of service) makes less than 60 percent of the average civilian surgeon's net income. Fairness alone might dictate continued raises, so as not to fall further behind the civilian sector. Moreover, because the recent Congressional debate has planted expectations of further improvements in pay, anything less might hurt morale.

Finally, the services can compensate to some extent for the effects of added retention by tightening their recruiting. The projections displayed in Table 8 assume that 1,400 physicians enter the military medical work force each year: about 900 from the Health Professionals Scholarship Program (HPSP), the rest as volunteers or from other sources. Suppose that the services instead recruit only enough physicians to keep the total force at or below the peacetime-based requirement. Then they could continue current policy, or create incentives for multiyear commitments, without surpassing the lower peacetime-based requirement. Under current policy, for example, reducing the number of physicians who enter the military each year to 1,100 would compensate for the additional physicians retained; this estimate assumes that senior physicians are relatively unresponsive to changes in pay, and that the flow of scholarship physicians and volunteers decreases proportionally.

Relying on reduced recruiting to counteract increases in retention, however, may be risky. The services can easily reduce the number of HPSP awards, but they cannot so easily distribute those reductions as desired among the various specialties. The reason is that scholarships are bestowed not on surgeons, obstetricians, and family practitioners, but on medical school students whose decisions about specialization lie several years in the future. Try to curtail the future flow of surgeons, and the services might unexpectedly disrupt the flow of obstetricians and internists.

Costs offer another argument against continued raises for military physicians. Even if the services hold down the number of active-duty physicians through tightened recruiting, they may not be able to save much in medical special pays. Under current policy, for example,

tightened recruiting would lead to about 1,000 fewer active-duty physicians than served in 1988; yet spending on medical special pays would stay virtually unchanged from current levels. In a time of budgetary austerity, that might be viewed as unfair to the military's other officers, whose numbers and pay will be reduced if the Defense Department and the Congress opt for a smaller active-duty force.

Freeze Medical Pay

If the arguments against continued increases in pay prevail, what are the alternatives? One logical response might be to end the multiyear MORB as called for under current policy, but also freeze the remaining military medical pays (variable special pay, additional special pay, board-certified pay, and incentive special pay) at their nominal 1990 rates. If the freeze lasted five years, these medical pays would lose about one-fifth of their real value to inflation--assuming, as CBO projects, that inflation continues at about 4 percent a year. Assuming that regular military compensation kept pace with inflation, the relative value of military pay--that is, its ratio to average net civilian income--might decline to just below its level in 1988. At that point, this option assumes that military medical pay would be increased to keep pace with inflation, thus avoiding further reductions in its real value.

This approach would parallel past actions by the Congress. In 1980, the Congress approved a new system of medical special pays, then left them virtually unchanged until 1989. During that time, inflation eroded about one-third of the value of the special pays.

Long-run projections show that this treatment of medical pay would produce a medical corps of 9,430 or 9,540 physicians. Although too small to satisfy the services' budget authorizations, a corps this size would more than fill the requirement for 8,320 physicians, the number that may be needed if the armed forces are one-third smaller. Requirements would be filled to 98 percent or more in all but the internal non-surgical specialties and obstetrics/gynecology (see Table 12). As for experience, the proportion of physicians in the work force with more than 12 years of active-duty service is projected to reach 22 percent, three percentage points above today's level. A five-year freeze would do all

this while containing spending on military medical pay to \$269 million a year, a decrease of between \$188 million and \$240 million from the continuation of current policy.

Indeed, the Defense Department might need to freeze pay for more than five years to bring the active-duty medical corps down to 8,320 physicians. But even more serious imbalances might develop among the different specialties. Moreover, the longer the freeze, the greater the chances that morale will suffer and that the best physicians will leave.

TABLE 12. PROJECTED STEADY-STATE EFFECTS OF FREEZING PAY FOR FIVE YEARS

Specialty	Require- ments ^a	Baseline ^b			Projected Effects ^c					
		End Strength	Percentage of Require- ments Met	Medical Special Pays ^d	End Strength		Percentage of Require- ments Met		Medical Special Pays ^d	
					High	Low	High	Low	High	Low
Primary	2,800	3,640	130	93	3,710	3,690	133	132	96	95
Nonsurgical Specialty	1,090	990	91	25	1,010	1,000	93	92	26	25
Surgical	670	1,010	151	31	1,070	1,050	161	157	36	35
Surgical-Related	470	440	94	11	480	460	102	98	16	16
Obstetrics/ Gynecology	690	450	65	13	470	470	68	68	16	16
Hospital-Based	1,050	1,020	97	29	1,060	1,050	101	100	34	34
Other	<u>1,550</u>	<u>1,650</u>	106	<u>40</u>	<u>1,740</u>	<u>1,710</u>	112	110	<u>45</u>	<u>45</u>
Total ^e	8,320	9,200	111	242	9,540	9,430	115	113	269	266

SOURCE: Congressional Budget Office.

NOTE: *Primary* includes family and general practice, general pediatrics, physical and preventive medicine, neurology, and general internal medicine; *Nonsurgical specialty* includes dermatology, cardiology, and other internal medical and pediatric subspecialties; *Surgical* includes general, orthopedic, and specialized surgery; *Surgical-related* includes otolaryngology, ophthalmology, and urology; *Hospital-based* includes anesthesiology, radiology and nuclear medicine, and pathology; and *Other* includes aviation and undersea medicine, emergency medicine, and psychiatry.

- Based on staffing standards of health maintenance organizations for a peacetime population of 6.6 million beneficiaries.
- End strengths and costs are estimated by extrapolating 1988 rates of pay and retention into the steady state.
- The high case assumes that physicians past the initial obligation are one-third as responsive to changes in pay as physicians at the initial obligation; the low case, one-sixth as responsive.
- In millions of 1990 dollars.
- Excludes physicians in administration and in training (interns, residents, and fellows).

Keep Pay at Real 1990 Levels and Reduce Recruiting

If the Congress decides that freezing special pay is too draconian an option, it might choose to pair more modest constraints on medical pay with modest constraints on recruiting. Rather than hold medical special pays at their 1990 rates, for five or however many years, the services could keep the sum of medical special pays at real 1990 levels. For example, the typical military surgeon now earns a total of \$45,000 in medical special pay: \$29,000 in across-the-board pays, and \$16,000

TABLE 13. PROJECTED STEADY-STATE EFFECTS OF HOLDING PAY AT REAL 1990 LEVELS FOR FIVE YEARS AND REDUCING ACCESSION OF VOLUNTEERS BY ONE-THIRD

Specialty	Require-ments ^a	End Strength	Baseline ^b		Projected Effects ^c					
			Percentage of Require-ments Met	Medical Special Pays ^d	End Strength		Percentage of Require-ments Met		Medical Special Pays ^d	
					High	Low	High	Low	High	Low
Primary	2,800	3,640	130	93	3,430	3,350	123	120	112	110
Nonsurgical										
Specialty	1,090	990	91	25	1,070	1,040	98	95	34	33
Surgical	670	1,010	151	31	1,010	960	151	143	42	39
Surgical-Related	470	440	94	11	470	440	100	94	20	19
Obstetrics/ Gynecology	690	450	65	13	440	430	64	63	19	19
Hospital-Based	1,050	1,020	97	29	1,050	1,020	100	97	40	39
Other	1,550	1,650	106	40	1,620	1,550	104	100	53	51
Total ^e	8,320	9,200	111	242	9,090	8,790	109	106	320	310

SOURCE: Congressional Budget Office.

NOTE: *Primary* includes family and general practice, general pediatrics, physical and preventive medicine, neurology, and general internal medicine; *Nonsurgical specialty* includes dermatology, cardiology, and other internal medical and pediatric subspecialties; *Surgical* includes general, orthopedic, and specialized surgery; *Surgical-related* includes otolaryngology, ophthalmology, and urology; *Hospital-based* includes anesthesiology, radiology and nuclear medicine, and pathology; and *Other* includes aviation and undersea medicine, emergency medicine, and psychiatry.

- Based on staffing standards of health maintenance organizations for a peacetime population of 6.6 million beneficiaries.
- End strengths and costs are estimated by extrapolating 1988 rates of pay and retention into the steady state.
- The high case assumes that physicians past the initial obligation are one-third as responsive to changes in pay as physicians at the initial obligation; the low case, one-sixth as responsive.
- In millions of 1990 dollars.
- Excludes physicians in administration and in training (interns, residents, and fellows).

in incentive special pay. To cover the expected effects of inflation of about 4 percent a year, the services would raise that total to \$47,000 in 1991, \$49,000 in 1992, and so on.

The services could accommodate these increases under current policy, which permits increases in incentive special pay to offset the end of the multiyear MORB. They would simply increase incentive special pay by enough to cover inflation; no new legislation would be required. (In contrast, the option first mentioned in this chapter--continuing current policy--assumes that incentive special pay would increase enough to offset the end of the MORB.)

As for recruiting, this option assumes that the services reduce the annual inflow of nonscholarship physicians by about one-third. The total number of accessions thus becomes 1,225, comprising about 900 scholarship physicians and 325 physicians from other sources. In contrast with scholarship physicians, the flow of volunteers can be controlled by specialty, thus lessening the risk of skill imbalances discussed earlier.

Keeping pay at 1990 levels, while modestly tightening recruiting, will lead to a projected force that is close in size to the total peacetime-based requirement (see Table 13). As in the other options, only obstetrics/gynecology would lack enough physicians to fill requirements. Most other specialties would be filled to just under or just above requirements, with the notable exception of surgery. The services could find themselves with half again as many surgeons as needed. Long-run annual costs are projected to range between \$311 million and \$321 million. Keeping pay at 1990 levels would therefore cost \$44 million to \$51 million a year more than would freezing pay. However, it would be \$144 million to \$189 million less expensive than continuing current policy--a worthwhile savings if the Defense Department needs fewer than 9,000 physicians.

APPENDIXES

APPENDIX A

METHOD FOR ANALYZING

THE EFFECTS OF PAY

This appendix describes CBO's method for forecasting the number of physicians in the work force, and associated costs, under alternative plans for medical special pay. Since each of the plans examined here has differing effects on the various medical specialties, the method treats each medical specialty (or grouping of like specialties) as a distinct community.

BASELINE PROJECTIONS

The analysis starts by configuring the physician work force by medical specialty and by how they entered the military medical corps. Physicians fall in one of 14 specialty groups that reflect the classifications used by various pay plans. For example, because each of the pay plans examined here treats all surgeons alike, general surgeons, specialized surgeons, and orthopedic surgeons form one specialty group, "Surgery" (a complete list appears in Table A-1). Physicians are also grouped in one of three "source-of-entry" classes, depending on whether they joined the work force as direct Health Professionals Scholarship Program (HPSP) students, as deferred HPSP students, or as non-HPSP physicians (most of whom are volunteers).

Retention Rates

The Department of Defense (DoD) provided CBO with computer tapes (prepared according to DoD directive 1340.13, September 27, 1982) that record detailed information about individual active-duty physicians, including whether they left service during 1988. Using these data, CBO estimated retention rates for each of the specialty and source-of-entry combinations, based on the number of physicians on active duty at the beginning of 1988 who were at the end of or past

their initial obligations and who did not leave during the year. Retention rates vary by years of service (YOS), starting with the year in which most physicians of a particular specialty and source of entry make their initial stay-or-leave decision; and advancing to 30 years of service. As shown in Table A-1, retention rates at the end of the initial obligation vary widely by specialty and source of entry; though not shown, retention rates of physicians who stay past the initial obligation vary over a much narrower range.

TABLE A-1. ESTIMATED 1988 RETENTION RATES OF PHYSICIANS AT THE END OF THEIR INITIAL OBLIGATION (Percentage staying)

Specialty	Source of Entry		
	Direct HPSP	Deferred HPSP	Other
Anesthesiology	32.0	33.0	10.0
Aviation	62.5	40.0	79.0
Dermatology	29.1	18.0	49.0
Emergency Medicine	18.2	20.0	75.0
Family Practice and Pediatrics	37.5	23.0	57.0
General	22.0	25.0	45.0
General Internal ^b	35.9	23.0	45.0
Internal Subspecialties	35.5	16.0	48.0
Obstetrics/Gynecology	50.0	10.7	57.0
Pathology	33.2	23.0	51.0
Psychiatry	33.3	50.0	64.0
Radiology	30.0	14.0	58.0
Surgery	35.5	18.5	47.2
Surgery-Related ^a	41.7	35.7	42.9

SOURCE: Congressional Budget Office.

NOTE: Direct HPSP (Health Professionals Scholarship Program) physicians come on active duty right out of medical school and receive their graduate medical education in a military training program. Deferred HPSP physicians receive residency training in civilian institutions, then come on active duty as fully trained specialists. Other physicians are volunteers and recruits from the Uniformed Services University of the Health Sciences, the Reserve Officer Training Corps, and the service academies.

a. Ophthalmology, otolaryngology, and urology.

b. Includes preventive and physical medicine and neurology.

For the non-HPSP physicians, retention rates were based on actual, observable experience for all years of service. However, because the HPSP program only began in the 1970s, virtually no HPSP physician had more than 12 years of service in 1988. In these instances, CBO imputed the observable retention rates of volunteers on the assumption that all military physicians in midcareer behave similarly regardless of how they entered service. Also, in some earlier years of service, so few deferred HPSP physicians were on active duty that their estimated retention rates are highly imprecise.¹ In these cases, CBO substituted the observable retention rates of direct HPSP physicians.

Steady-State Inventories

Using the estimated retention rates, CBO constructed a composite picture of a survivor function for each specialty group that shows the probability that a physician will stay in the military from the time the initial obligation ends up to 30 years, the maximum possible length of service. This survivor function forms the basis for CBO's long-run projections; if one physician enters the work force every year for 30 years, then the sum of the survival probabilities will equal the total number, or inventory, of physicians in the "steady state" (a number that will remain constant over time).

The actual number of physicians entering the work force each year was set so that the steady-state inventory equaled the number of physicians on active duty, and not in training, at the end of 1988. This number was divided among the HPSP and non-HPSP categories according to the percentage distribution of physicians with 14 or fewer years of service by source of entry. The sum total of physicians entering the work force was 1,400 a year, giving the baseline work force about 9,200 physicians, distributed among the various specialties in line with current proportions.

1. The estimated standard error of a retention rate is $(R(1-R)/ES)^{1/2}$, where R equals the retention rate and ES equals the number of physicians on active duty at the start of the fiscal year. See David Bartholomew and Andrew Forbes, *Statistical Techniques for Manpower Planning* (Chichester, England: John Wiley & Sons, 1979).

A specific numerical example, for surgeons, appears in Table A-2. While under obligation, physicians are assumed to have 100 percent retention. Deferred HPSP and volunteer physicians are assumed to enter the military as fully trained specialists, and so their retention rates start at YOS 1. The first and crucial stay-or-leave decision follows by several years; 19 percent of deferred HPSP surgeons and 47 percent of volunteer surgeons stay past their initial obligation. Direct HPSP physicians enter the work force full time after at least five years of training and are assumed to make their first retention decision at the end of their initial, four-year obligation (YOS 9); 35 percent decide to stay. With these retention rates, the associated survivor functions suggest that the annual entry of 167 physicians would maintain a steady-state force of 1,007 surgeons, roughly the number on active duty at the end of 1988.

Costs of Medical Pay

Associated with the steady-state inventory of physicians is a range of medical special pays. Three of those pays--variable special pay (VSP), additional special pay (ASP), and board-certified pay (BCP)--are received by all physicians regardless of specialty. They hinge on years of creditable service (YOCS), which includes active-duty service (YOS) plus any time spent in a civilian residency. For direct HPSP physicians, YOS and YOCS are synonymous; for other physicians, CBO assumed that YOCS includes the average training time for each specialty.

In contrast to the three across-the-board pays, incentive special pay (ISP) varies by specialty and, in some cases, by years of experience. Experience is readily estimated for HPSP students. For volunteers, CBO based experience on the average time that had passed between graduating from medical school and joining the military, adjusted for the average length of training for a particular specialty.

As a check on the reliability of these assumptions, CBO compared the estimated costs of VSP, ASP, BCP, and ISP in a steady-state force,

TABLE A-2. RETENTION PATTERNS OF SURGEONS AND
ORTHOPEDIC SURGEONS ON DUTY IN 1988,
BY YEARS OF ACTIVE-DUTY SERVICE

Years of Service	Estimated Retention Rates in 1988			Survival Distribution (Percent)			Inventory Flow (Number of surgeons)			
	Direct HPSP	Deferred HPSP	Other	Direct HPSP	Deferred HPSP	Other	Direct HPSP	Deferred HPSP	Other	Total
1		1.00	1.00		1.00	1.00		35	76	111
2		1.00	1.00		1.00	1.00		35	76	111
3		1.00	0.47		1.00	1.00		35	76	111
4		1.00	0.67		1.00	0.47		35	36	71
5		0.19	0.87		1.00	0.31		35	24	59
6	1.00	0.65	0.65	1.00	0.19	0.27	56	7	21	83
7	1.00	0.83	0.83	1.00	0.12	0.18	56	4	13	74
8	1.00	0.95	0.95	1.00	0.10	0.15	56	4	11	71
9	0.35	0.86	0.86	1.00	0.09	0.14	56	3	11	70
10	0.83	0.83	0.83	0.35	0.08	0.12	20	3	9	32
11	0.85	0.91	0.91	0.30	0.07	0.10	17	2	8	26
12	0.77	0.69	0.69	0.25	0.06	0.09	14	2	7	23
13	0.96	0.96	0.96	0.19	0.05	0.06	11	1	5	17
14	0.89	0.89	0.89	0.19	0.04	0.05	10	1	5	16
15	0.93	0.93	0.93	0.17	0.04	0.05	9	1	4	15
16	0.89	0.89	0.89	0.16	0.04	0.04	9	1	4	14
17	0.95	0.95	0.95	0.14	0.03	0.04	8	1	3	12
18	1.00	1.00	1.00	0.13	0.03	0.04	7	1	3	12
19	0.94	0.94	0.94	0.13	0.03	0.04	7	1	3	12
20	0.79	0.79	0.79	0.12	0.03	0.04	7	1	3	11
21	0.71	0.71	0.71	0.10	0.02	0.03	6	1	2	9
22	0.86	0.86	0.86	0.07	0.02	0.02	4	1	2	6
23	1.00	1.00	1.00	0.06	0.01	0.02	3	0	1	5
24	1.00	1.00	1.00	0.06	0.01	0.02	3	0	1	5
25	1.00	1.00	1.00	0.06	0.01	0.02	3	0	1	5
26	1.00	1.00	1.00	0.06	0.01	0.02	3	0	1	5
27	1.00	1.00	1.00	0.06	0.01	0.02	3	0	1	5
28	1.00	1.00	1.00	0.06	0.01	0.02	3	0	1	5
29	1.00	1.00	1.00	0.06	0.01	0.02	3	0	1	5
30	0.67	0.67	0.67	0.06	0.01	0.02	3	0	1	5
Total				6.8	6.1	5.4	380	216	412	1,007

SOURCE: Congressional Budget Office.

NOTE: Direct HPSP (Health Professionals Scholarship Program) physicians come on active duty right out of medical school and receive their graduate medical education in a military training program. Deferred HPSP physicians receive residency training in civilian institutions, then come on active duty as fully trained specialists. Other physicians are volunteers and recruits from the Uniformed Services University of the Health Sciences, the Reserve Officer Training Corps, and the service academies.

based on 1988 retention rates and pay rates, with actual costs in 1988. That year, spending on medical special pays totaled about \$209 million; costs for a steady-state force were projected to be \$220 million, only about 5 percent higher than actual spending. The difference stems largely from the greater seniority of the steady-state force. In 1988, 19 percent of physicians in the work force had more than 12 years of service; in the steady-state, the projected figure is 21 percent.

MODELING THE EFFECTS OF CHANGES IN PAY

Alternative pay plans alter the long-run size of the medical corps through their estimated effects on retention rates. Based on a model of retention that relates the decision to stay or leave made by individual physicians to their pay, CBO estimated how each of the pay plans in this report would affect the retention rates of physicians.

Model

Upon reaching the end of their initial period of obligation, physicians face two choices: continue on active duty, or leave for the "best" civilian alternative. The probability of choosing to stay can be given by the so-called logistic distribution:

$$P = 1/(1 + e^{-x\beta})$$

where x is a vector of explanatory variables (described below) and β is a vector of estimated coefficients. Given appropriate data, the logistic parameters can be estimated using maximum likelihood procedures. With such an equation, one can establish the effect of pay on individual differences in the probability of staying.

Data

Data for the analysis came from computer tapes that record information about individual physicians on active duty in the years 1981 through 1988. CBO focused on the initial retention decisions of 1,786

physicians who came on active duty between 1981 and 1987 and whose initial obligation dates occurred before 1989 (and at least two years after the dates of accession).

To reflect differences in initial preference for a career in the military, physicians were stratified by source of entry: 1,136 physicians joined as volunteers, and 650 joined as deferred HPSP students. (Since virtually no direct HPSP students finished their initial obligations before 1989, none was included in the analysis.) Over the 1981-1988 period, 26 percent of the deferred HPSP students and 60 percent of the volunteers stayed beyond the initial obligation. Each individual's decision to stay or leave became the dependent variable in a logistic regression.

Specification

For each group of physicians, CBO estimated a logistic regression whose explanatory variables included the natural log of the military and civilian earnings ratio--to measure the effects of pay--as well as years of practicing medicine, board certification, citizenship, and specialty (primary or nonprimary care). These last four variables, though certainly not exhaustive, reflect some of the nonpay factors that may influence physicians to stay or leave.² These variables and their mean values for different groups of physicians appear in Table A-3.

Military and Civilian Earnings. Military earnings, comprising regular military compensation (RMC) and the medical special pays, were estimated for each physician at the time that the initial obligation ended, based on that individual's pay grade, years of creditable service, years of experience, specialty, and branch of service. Military earnings varied over time because of Congressionally mandated changes in the basic pays and allowances, and because of modest changes in incentive special pay. Between 1981 and 1988, the services frequently modified

2. A richer model specification would include additional variables describing the individual physician's personal and demographic characteristics and conditions of practice. Unfortunately, the data tapes offered only a limited amount of information. Two additional nonpay variables were tested--branch of service and speed of promotion (for example, deferred HPSP physicians were considered to be on a "fast track" if they were promoted from O-3 to O-4 in less than six years)--but lacked both statistical and practical significance.

the size of ISP payments and the specialties receiving ISP. For example, general surgeons in the Navy received \$8,000 in ISP in 1985, \$5,000 in 1986 and 1987, and either \$5,000 or \$8,000 in 1988 depending on their years of experience; radiologists received nothing between 1985 and 1987, and \$3,500 in 1988.

Estimated civilian earnings were based on each individual's specialty and years of experience. The American Medical Association (AMA) provided data on physicians' average annual net incomes by specialty and intervals of years of experience (that is, less than five years of practice, five to nine, and so on to 35 or more years of practice). To get specific estimates for each year of experience (as well as to "smooth" the profiles of income experience), CBO regressed average income on years of experience and years of experience squared, using the midpoint of each experience interval.

TABLE A-3. EXPLANATORY VARIABLES IN THE LOGISTIC REGRESSION EQUATIONS

	Stayers		Leavers		All	
	Deferred HPSP	Other	Deferred HPSP	Other	Deferred HPSP	Other
LNEARN	-0.572	-0.643	-0.619	-0.686	-0.607	-0.660
YRP	4.3	10.7	4.6	9.2	4.5	10.1
BC	0.689	0.563	0.785	0.416	0.760	0.504
NONCITZ	0.042	0.076	0.050	0.140	0.048	0.101
PRIM	0.335	0.254	0.317	0.273	0.322	0.261
Number of Physicians	167	686	483	450	650	1,136

SOURCE: Congressional Budget Office.

NOTES: LNEARN is the natural log of the military and civilian earnings ratio. YRP is years of practice at time of initial obligation decision. BC is 1 if board certified; 0 otherwise. NONCITZ is 1 if not a U.S. citizen; 0 otherwise. PRIM is 1 if the physician is a family/general practitioner, pediatrician, or internist; 0 otherwise.

Deferred HPSP (Health Professionals Scholarship Program) physicians receive residency training in civilian institutions, then come on active duty as fully trained specialists. Other physicians are volunteers and recruits from the Uniformed Services University of the Health Sciences, the Reserve Officer Training Corps, and the service academies.

Results

The final estimated equations appear in Table A-4. When evaluated at the mean values of the explanatory variables, the equations for both deferred HPSP and non-HPSP physicians yield similar elasticities of retention. The average pay elasticity for deferred HPSP physicians is roughly 0.7 (with a 95 percent confidence interval ranging between 0.1 and 1.2). Thus, a 10 percent increase in military pay would be likely to raise initial retention of deferred HPSP physicians from 26 percent to between 26 percent and 29 percent. For volunteer physicians, the average pay elasticity is about 0.5 (with a 95 percent confidence interval of 0.3 to 0.7). Thus, a 10 percent change in the earnings ratio would likely raise volunteers' retention from 60 percent to between 61 percent and 64 percent. That these two disparate groups are alike in their responsiveness to changes in pay suggests that direct HPSP physicians—who arguably lie between deferred HPSP students and volunteers in their degree of preference for military service—might also have a pay elasticity in the range of 0.5 to 0.7 at the end of their initial obligation.

Specialty was of neither statistical nor practical significance in explaining retention among deferred HPSP physicians. Among volunteers, however, primary care physicians appear to be less willing than other physicians to stay past the initial obligation, at a given earnings ratio. Compared with other military physicians, primary care physicians are perhaps least likely to enjoy styles of practice characteristic of the civilian sector, and therefore are more likely to want to leave the military.³ Physicians outside the military, based in offices, generally establish close relationships with their patients over a long time. Military physicians, in contrast, must contend with overcrowded clinics and a transient patient population.

Because of the small differences in the estimated elasticities, and for the sake of simplicity, CBO used a single elasticity of 0.6 to estimate the effects of changes in pay on physicians making their first

3. Victoria Daubert, *Retention of Volunteer Physicians in the U.S. Air Force* (Santa Monica: RAND Corporation, February 1985).

TABLE A-4. MAXIMUM LIKELIHOOD RESULTS FOR THE LOGISTIC MODEL

	Deferred HPSP	Other
LNEARN	0.942	1.253
(standard error)	(0.423)	(0.286)
t-statistic	2.227	4.380
YRP	-3.789	0.160
(standard error)	(0.949)	(0.033)
t-statistic	-3.991	4.806
YRP ²	0.369	-0.005
(standard error)	(0.104)	(0.001)
t-statistic	3.544	-4.324
BC	-0.425	0.320
(standard error)	(0.214)	(0.134)
t-statistic	-1.983	2.380
NONCITZ	-0.218	-0.749
(standard error)	(0.453)	(0.208)
t-statistic	-0.480	-3.608
PRIM	-0.108	-0.558
(standard error)	(0.226)	(0.189)
t-statistic	-0.478	-2.946
INTERCEPT	9.232	0.476
-2x LLR (log of the likelihood ratio)	38.26	66.97
Degrees of freedom	6	6
Significance beyond	0.99	0.99
Observations	650	1,136

SOURCE: Congressional Budget Office.

NOTES: LNEARN is the natural log of the military and civilian earnings ratio. YRP is years of practice at time of initial obligation decision. BC is 1 if board certified; 0 otherwise. NONCITZ is 1 if not a U.S. citizen; 0 otherwise. PRIM is 1 if the physician is a family/general practitioner, pediatrician, or internist; 0 otherwise.

Deferred HPSP (Health Professionals Scholarship Program) physicians receive residency training in civilian institutions, then come on active duty as fully trained specialists. Other physicians are volunteers and recruits from the Uniformed Services University of the Health Sciences, the Reserve Officer Training Corps, and the service academies.

stay-or-leave decision. As explained in the text, CBO assumed that physicians making later stay-or-leave decisions would be either one-third or one-sixth as responsive to changes in pay (pay elasticities of 0.20 or 0.10), based on estimates of pay elasticities in the enlisted force.

EFFECTS OF ALTERNATIVE PAY PLANS

Using its estimated pay elasticities, CBO readily calculated the effects of alternative pay plans discussed in Chapter III that do not include a multiyear option. Each such plan results in a given percentage change in the military pay ratio that varies by specialty and by years of service. When multiplied by the appropriate pay elasticity, the change produces a percentage change in the retention rates of each medical specialty. That change, in turn, produces new steady-state inventories and steady-state costs.

Calculating the effects of multiyear pays (including the medical officer retention bonus, or MORB) is less straightforward because of uncertainty over how physicians will respond to such an option. As discussed in the text, CBO assumed two possibilities--a shift effect and a retention effect. Under a shift effect, physicians who would have otherwise stayed in service stay longer. Under a retention effect, not only would physicians stay longer, but more of them would stay.

Shift Effect

CBO's approach to estimating the shift effect is based heavily on experience with the MORB in 1989. Starting with the year of service when the initial obligation ends, CBO estimated a four-year survivor function for each specialty and source-of-entry combination (based on 1988 retention rates that had been adjusted for 1990 changes in medical special pays). CBO then took the distribution of MORB awards in 1989--the percentage of physicians agreeing to stay two, three, or four years--and adjusted the survivor function for the second, third, and fourth years to reflect increased length of service. This rather convoluted approach was dictated by an absence of complete data on 1989 retention. At the time of analysis, CBO did not know

either the proportion of physicians staying past the initial obligation or the proportion of stayers who took a MORB.

Based on 1988 retention rates, CBO expects that 37 out of 100 direct HPSP surgeons would stay past their initial obligation (see Table A-5). Of those 37, 16 percent (6 surgeons) stay for just one more year; 12 percent (4 surgeons) stay for two more years; 16 percent (6 surgeons) stay for three more years; and 56 percent (21 surgeons) stay for at least four more years. The shift effect only works on the 31 physicians staying for two, three, or four more years.

In 1989, surgeons actually signed up for MORBs in the following proportions: 12 percent for two years, 6 percent for three years, and 82 percent for four years. When applied to the 31 physicians staying beyond one additional year, these percentages produce a new length-of-service distribution, though no change in the number of stayers. As before, 37 out of 100 surgeons stay past their initial obligation--6 of them for just one more year, but 69 percent (26 surgeons) for at least four more years. The process repeats at the next four-year point.

TABLE A-5. ILLUSTRATIVE EXAMPLE OF THE SHIFT EFFECT ON DIRECT HPSP SURGEONS

Years Past Initial Obligation	Number Staying ^a	1988 Base		Percent- age Who Took a MORB in 1989	Number Staying ^a	Shift Effect	
		Percentage Staying One to Four Years	Two to Four Years			Percentage Staying One to Four Years	Two to Four Years ^b
One	37	16			37	16	
Two	31	12	14	12	31	10	12
Three	27	16	19	6	28	5	6
Four	21	56	67	82	26	69	82

SOURCE: Congressional Budget Office.

NOTE: Direct HPSP (Health Professionals Scholarship Program) physicians come on active duty right out of medical school and receive their graduate medical education in a military training program.

a. Assumes that 100 surgeons reach the initial obligation date.

b. Equal to the percentage who took a medical officer retention bonus (MORB) in 1989.

Retention Effect

The shift effect assumes retention rates would not change at the initial obligation. In contrast, the retention effect assumes that multiyear pays would prompt more physicians to stay. To estimate the effect, CBO converted a given range of awards to a weighted bonus-equivalent amount, where the weights are the probabilities in the survivor function above.

Consider the case of surgeons under the MORB. Those signing a two-year contract received \$10,000 (weighted by 0.10); three-year signers received \$15,000 (weighted by 0.05); four-year signers received \$20,000 (weighted by 0.69); and those not signing a contract received nothing (weighted by 0.16). Thus, the MORB is estimated to have the same percentage effect on retention as a bonus of \$15,550. Whereas 37 surgeons out of 100 continued past the initial obligation under the shift effect, retention is projected to rise to 45 out of 100 under the retention effect.

APPENDIX B

THE COST-EFFECTIVENESS OF MILITARY PHYSICIANS

The discussion in Chapter II of the cost-effectiveness of adding full-time physicians is based on a study by the Office of the Assistant Secretary of Defense for Program Analysis and Evaluation titled *Peacetime Requirements for Physicians and Nurses in the DoD Direct Care System* (February 1989). The assumptions and findings of that study, as well as its limitations, are detailed in this appendix.

DOD's STUDY OF COST-EFFECTIVENESS

The Defense Department study related cost-effectiveness to the amount of health care provided by the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS) that would be economical for military hospitals and clinics to regain. Defense Department analysts looked at the use of CHAMPUS in 1987 by beneficiaries living inside catchment areas--areas roughly 40 miles around a military treatment facility. Excluded were CHAMPUS admissions for which the program is a second payor to private insurance (one-fifth of total admissions) and CHAMPUS admissions by beneficiaries living outside catchment areas. Assuming that the military could regain all of CHAMPUS's nonpsychiatric inpatient care and 45 percent of its outpatient care, the analysts came up with two cost-effective operating levels for military hospitals and clinics, one low and one high. The low operating level includes a 5 percent increase in outpatient visits, the high one an 11 percent increase (both include about a 14 percent increase in inpatient bed-days).

Why two operating levels? If the capacity of military hospitals and clinics was to increase, the number of new outpatient visits to those facilities might very well exceed the number paid for under CHAMPUS. Since care is free in military clinics, beneficiaries might visit physicians more often than under CHAMPUS--visits for which they were

paying 20 percent or 25 percent of doctors' fees. Uncertainty about the ratio of new to old visits--that is, the trade-off between CHAMPUS visits and visits to military clinics--led the Defense Department to use the two alternative operating levels. The lower level assumes that every visit taken away from CHAMPUS leads to a single added military visit; at such a one-to-one trade-off, it is always cost-effective to recover CHAMPUS's outpatient work load. The upper level assumes that every visit taken away from CHAMPUS leads to one and one-half added military visits if the beneficiary is an active-duty dependent, four added military visits if the beneficiary belongs to a retired military family; with the higher trade-off, it is generally not cost-effective to recover CHAMPUS's outpatient work load. The savings from recovering inpatient care, however, would more than cover the losses on the outpatient side.

To handle these higher operating levels, the military would presumably need additional physicians--a proportionate increase, in the view of the Defense Department. As shown in Table 4 in the text, these increases would extend proportionally across the various clinical areas except psychiatry, emergency medicine, and aviation and undersea medicine. Under the lower operating level, the military would thus need 687 additional physicians; under the higher level, 1,028 added physicians.

LIMITATIONS OF DOD's STUDY

DoD's study contains two serious limitations that hamper its usefulness: it fails to include the costs of recruiting or retaining additional physicians, and it fails to account for the possible responses of physicians to increases in staffing.

Incomplete Treatment of Costs

Perhaps foremost among the limitations of this analysis is an incomplete treatment of costs. Based on the Defense Department's estimates, recovering CHAMPUS's work load could save the government either \$266 million a year (under the lower operating level) or \$126

million a year (under the higher operating level). These savings, however, do not include the cost of the medical special pays for the additional physicians. Increased spending on variable and additional special pay, and board-certified pay, would reduce the government's net savings by \$18 million to \$26 million a year.

Nor did the department's study include the cost of retaining additional physicians. Suppose, for example, that the services pay higher bonuses to encourage enough additional physicians to stay in service. When the marginal cost per additional physician retained exceeds a certain threshold, DoD's net savings from regaining CHAMPUS's work load evaporate. This threshold cost amounts to about \$354,000 per physician under the lower, cost-effective operating level (for an added 687 physicians), and \$99,000 under the higher operating level (for an added 1,028 physicians).

Cost-Effectiveness Undermined by Changes in Behavior

Basing the cost-effectiveness of military physicians on likely savings from CHAMPUS raises a more profound difficulty. Put simply, adding physicians to the active-duty force may not, at least in the short run, lower CHAMPUS's costs. The reasons relate to possible changes in how physicians work: the added specialists might recover work load from primary care physicians rather than from CHAMPUS ("work-load shifts"), and physicians generally might take more time for activities not related to patient care ("time trade-offs"). (These phenomena are explained below.) This is not to say that adding active-duty physicians would be a waste: both the quality of care and the morale of providers and beneficiaries would benefit. But if the Congress expects to see immediate, large savings in CHAMPUS's costs when the medical corps gains extra physicians, it may be disappointed.

Work-Load Shifts. When medical specialists are in relatively short supply in a military hospital, primary care physicians tend to carry a heavier patient load. Any added specialists might therefore recover work load from their primary care colleagues, in addition to (or instead of) recovering care from CHAMPUS.

TABLE B-1. RELATIONSHIP BETWEEN AVERAGE TIME SPENT IN DIRECT PATIENT CARE BY PRIMARY CARE PHYSICIANS AND THEIR PERCEIVED ACCESS TO MEDICAL SPECIALISTS

Timely Access to Medical Specialty Consultants ^a	Medical Center	Type of Hospital		All Hospitals
		Community Hospital	100 Beds or More	
Yes		Less than 100 Beds		
Number	162	131	88	381
Average hours per week	30.7	40.3	36.5	35.3
No				
Number	55	139	98	292
Average hours per week	33.8	48.9	42.9	43.9
Difference from "Yes"				
In hours	3.1	8.6 ^b	6.4 ^b	8.6 ^b
Percentage of hours	10	21	18	24

SOURCE: Congressional Budget Office based on data in Department of Defense, 1984 Physicians Survey.

NOTE: Data reflect the responses of primary care physicians past their residency (family practice, general medicine, and internal medicine) who work in military hospitals in the continental United States.

a. "Yes" includes physicians who agreed or strongly agreed with the statement that physicians have timely access to medical specialty consultants where they are currently assigned; "No" includes those who disagreed or strongly disagreed.

b. Differences between those with and those without timely access are statistically significant at the 0.05 level.

Evidence comes from the experiences of primary care physicians stationed in military hospitals in the continental United States. According to data in a 1984 survey by DoD, primary care physicians who feel they do not have timely access to specialists spend 24 percent more hours in patient care than those who feel otherwise (see Table B-1). The relationship holds for all sorts of hospitals, whether they are medical centers or large or small community hospitals. Perhaps when spe-

TABLE B-2. ACTUAL AND DESIRED WORK PATTERNS OF PHYSICIANS WHO ARE ASSIGNED TO MILITARY HOSPITALS AND WHO SEE PATIENTS

	Weekly Activities					Total
	Direct Care	Administration/ Staff Work	Research/ Teaching	Learning/ Training	Military Activities	
Actual						
Hours per week	38.2	10.5	5.0	2.7	1.7	58.1
Percentage	65.7	18.1	8.5	4.7	3.0	100.0
Desired						
Hours per week	31.2	5.6	6.8	4.5	1.0	49.1
Percentage	63.5	11.5	13.9	9.2	1.9	100.0
Percentage change from actual hours	-18.3	-46.7	36.0	66.7	-41.2	-15.5
Desired Composition of Actual Hours						
Hours per week	36.9	6.7	8.1	5.3	1.1	58.1
Percentage change from actual hours	-3.4	-36.2	62.0	96.3	-35.3	0.0

SOURCE: Congressional Budget Office based on data in Department of Defense, 1984 Physicians Survey.

NOTE: "Actual" indicates the number of hours worked per week. "Desired" indicates the number of hours physicians would prefer to work each week. "Desired Composition of Actual Hours" indicates how physicians might prefer to reallocate the actual number of hours worked each week.

cialists are scarce, primary care physicians take care of patients whom they might otherwise refer to specialists; as in the civilian sector, some military physicians will respond to such a scarcity by working harder. Alternatively, when specialists are relatively available, they might provide a good deal of what is really primary care. Either situation is possible, since considerable uncertainty surrounds the proportion of a given disease or diagnostic category that "belongs" to each specialty.¹

Time Trade-offs. The number of hours spent in patient care is the most important factor determining a physician's weekly work load. Give the military health care system added resources, and physicians might be free to spend less time in patient care and more in research, professional learning, or leisure--all activities for which they have some relative preference (see Table B-2). Or, physicians might spend additional time with each patient, and so see fewer patients each day. Sur-

1. See Office of Technology Assessment, *Forecasts of Physician Supply and Requirements* (April 1980).

vey data suggest that physicians who only occasionally discuss the pros and cons of recommended treatment with patients average seven outpatient visits more a day than physicians who always discuss pros and cons.

Although these trade-offs might not counter increased use of CHAMPUS, they could lead to a higher quality of care. By spending more time with patients and by listening more, physicians might produce better outcomes. Their patients would leave the office more knowledgeable about instruction on medication, and thus better able to take new prescriptions properly.



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